INDEXES TO ITEMS

IN

NICKEL BULLETIN, 1961

VOLUME 34

		Pages
1.	Subject Index	315–334
2.	Corrigenda	334
3.	Trade Names referred to in Volume 34	335
4.	Name Index (Technical Abstracts)	336–338
5.	Name Index (Patent Abstracts)	339

SUBJECT INDEX TO VOLUME 34

The Index comprises a consolidated list of references, compiled from the sectional contents lists of the individual issues.

Within the Sections normally used (**NICKEL, ELECTRODEPOSITION**, etc.), the items are classified in appropriate sub-sections, within which they are, in most cases, entered in alphabetical order. The page number given is that on which the abstract containing the particular reference begins.

A list of **Trade-Named Materials** and **Processes** referred to in this volume appears on page 335.

LEADING ARTICLE

PROPERTIES OF MAR-AGEING 18 PER CENT. NICKEL-COBALT-MOLYBDENUM STEEL 115-6

NICKEL

Page

Analysis and Determination

Analysis
: Determination of Cobalt in Trace Amounts 117
: Determination of Zinc 4
: Mass-Spectroscopic Analysis 82
Determination of Nickel
: And Chromium in Mixtures without Prior Separation 143
: And Cobalt in Hard Magnetic Alloys by Voltammetric Techniques 148
: By Precipitation of Nickel Dimethyglyoximate from Homogeneous Solution 85
: By the Ring-Oven Technique 10
: By X-Ray Fluorescence Spectroscopy 82
: Colorimetrically in Microgram Amounts 212, 245
: Gravimetrically with 4-Methylnioxime 178
: Gravimetrically with Respropiophenone Oxime 178
: In Copper Alloys 85
: In Ferrous and Ferromagnetic Materials 86
: In High-Alloy Irons and Steels 80
: In Soils 178
: In Waste Effluents from Plating Operations 147
: Photometrically
: : As Its Pyridine Thiocyanate 178
: : In Small Amounts 86
: : Using Mineral Acids as Reagents 86
: Separation from Radiocobalt 4
: Ultra-Violet Absorption Spectra of Solutions of Copper and Nickel Complexes 143
: Using Dalzin 86
: Volumetrically in the Presence of Aluminium 85

Composition, Properties and Structure

Annealing Behaviour 83
Catalytically Active Nickel: Production by Reduction in Liquid Ammonia 212
Cold-Heading Properties 19
Cold-Drawn Nickel Wire: Fibre Texture 143
Cold-Worked Nickel: Influence of Impurities on Annealing Behaviour 83
Condenser Tubing: Resistance to Sea-Water Corrosion 108
Corrosion Characteristics in Contact with
: Bismuth (Liquid): Intercrystalline Penetration 261
: Bromine: Influence of Moisture on Resistance to 77
: Chlorohydrocarbons: Influence of Moisture on Resistance to 77
: Chlorides, Fused 71, 131
: Chloride Solutions 133
: Flue Gas from a Sulphate-Pulp-Recovery Furnace 50
: Fluorine: Suitability for Handling 48
: Sea Water 108
Creep-Rupture Behaviour
: Influence of Hot Working 100
: Influence of Section Size 159
: Influence of Tin 294
Deformation at High Temperatures and Strain Rates: Structural Changes during 283
Deposition from a Liquid-Metal Solution 246
Diffusion of Nickel
: During Sintering of Non-Compacted Mixtures of Nickel and Copper Powders 213
: In Iron 176
: With Niobium 195
Dynamic Moduli of Elasticity at Elevated Temperatures 227
Electron-Tube-Cathode Materials for Submarine Cable Systems
: Fundamental Study of High-Purity Nickel and Nickel Alloys 84
: Development and Performance of High-Purity Nickel-Alloy Cathodes 84
Embrittlement of High-Purity Nickel: Influence of Sulphur Content 55
E.m.f.: Influence of Pressure 192
Ferromagnetism: Theory of 55
Grain-Size: Influence of Undercooling 213
High-Field Elastic Constants: Temperature-Dependent Magnetic Contributions to 82

Page

Hot-Working: Influence on Structure and Creep-Rupture Properties 100
Hydrogen Precipitation from Buffered-Acid Solutions 4
Hydrogen Sulphide: Reaction with Nickel 131
Lead: Rate of Solution of Nickel in 143
Literature Review 96
Low-Temperature Mechanical Properties 54
Malleable Nickel: Influence of Minor Constituents and Melting Practice on Properties 239
Nickel-Cadmium Batteries
: Low-Temperature Characteristics 144
: Reviews 240
Nickel-Oxide Electrode: Electrochemical Behaviour 28
Nitrogen
: Influence of Nickel on Solubility in Liquid Iron 83
: Solubility in Liquid Nickel 83, 251
Nuclei: Growth during Thermal Decomposition of Nickel Formate 213
Oxidation
: Influence of Aluminium Additions 192
: Of High-Purity Nickel 283
Oxygen
: Adsorption on Nickel Films 255
: Chemisorption on Nickel; Reduction of Nickel Oxide by Hydrogen 27
Passivation Characteristics 131, 212, 240
Recrystallization: Embrittlement Associated with 55
Rubber: Protection Against Atmospheric Agents by Addition of Nickel Compounds 177
Saturation Magnetostriction Constants in Range −196° to +365°C. 27
Stainless Steel: Influence of Nickel on the Chromium and Carbon Relationship in Refining 161
Stress-Corrosion Cracking: Resistance to 133
Surface Energy and Surface Self Diffusion 82, 176
Surface Tension: Effect of Crystallographic Orientation 176
Tin: Influence on Creep and Fracture 294
Whiskers: Rôle of Halide-Cycle Reactions in the Growth of 177

General

Guide to Primary Nickel Products 282
International Nickel Company of Canada, Limited: History 142
Nickel: Literature Review 96

Nickel-Clad Materials

Nickel-Coated Copper Wire for Use in Electrical Equipment 145

Occurrence, Extraction and Refining

Chemical Requirements in the Recovery of Nickel 142
International Nickel Company of Canada, Limited: History 142
Lateritic Ores: Precipitation Process for Recovery of Nickel and Cobalt from 238
Roasting Processes Employed by INCO in the Refining of Nickel 238
Slurries, Acid: Symposium on Handling of 263-5
Sulphur-free Nickel: Production of 55

Page

Plating of Nickel

Preparation of Nickel for Electroplating with Nickel 144
Silver-Plated Nickel: Determination of the Thickness of the Silver Coating 92

Powder Production, Properties and Uses

(*For* Nickel and Nickel-Alloy Binders in Cermets, *see* **HEAT- AND CORROSION-RESISTING MATERIALS: Powder Production**)

Application of Corrosion-Resistant Nickel Coatings by Metallizing Techniques 144
Preparation of Nickel Powders Containing Uniform Polyhedra 86
Surface Diffusion During Sintering of Non-Compacted Mixtures of Nickel and Copper Powders 213

Processing

(*See also* **Occurrence, Extraction and Refining,** and **Welding**)

Annealing of Cold-Worked Nickel: Influence of Impurities 83
Cleaning Techniques for Nickel Electronic Components 56
Cold Drawing: Influence on Fibre Texture 143
Cold Heading 19
Hot Working: Influence on Structure and Creep-Rupture Properties 100
Melting of Malleable Nickel 239
Sintering of Non-Compacted Mixtures of Nickel and Copper Powders: Surface Diffusion during 213

Specifications and Testing

Determination of Nickel in Copper Alloys: *B.S.* 1748: 1961 85
Dynamic Moduli of Elasticity: Determination at Elevated Temperatures 227
Nickel-coated Copper Wire for Use in Electrical Equipment: *A.S.T.M. B*355-60*T* 145
Preparation of Nickel for Electroplating with Nickel: *A.S.T.M. B*343-60*T* 144
Saturation Magnetostriction Constants: Measurement by the Strain-Gauge Technique 27

Uses

(*See also* **Powder Production and Uses**)

Corrosion-Resistant 48, 50, 71, 77, 108, 131, 133
In Catalysis 212
In Cold-Headed Components 19
In Condenser Tubing 108
In Electron Tubes 55, 56, 84
In Enamelling 119, 217
In Protection of Rubber 177
In Storage Batteries 144, 240

Nickel Salts and Compounds

Deformation Modes in Face-Centred-Cubic Superlattice Alloys 6

Page

Intermetallic Compounds
: Extrusion 6
: Influence of Temperature on Mechanical Properties 5
: Of the Transition Metals 6
: Review of Literature on Mechanical Properties 5
'KPNi-1' (nickel isopropylxanthate): Protective Action in Vulcanization Systems 177
Laves Phases and AB_5 Compounds among Transition Elements 56
$MgNi_2$: Magnetic Susceptibility, Heat Capacity and Third-Law Entropy 87
NiAl : Extrusion 6
: Fractographic Studies 5
: High-Temperature Properties 6
: Influence of Composition on Properties 7
: $NiAl/Al_2O_3$ Sintered Materials 191
Ni_3Al : Fractographic Studies 5
: Influence of Composition on High-Temperature Properties 7
: Ni_3Al-Ni_3Cr System: Phase Equilibria and Elevated-Temperature Properties 157
Ni_3Cr-Ni_3Al System: Phase Equilibria and Elevated-Temperature Properties 157
Ni_3Fe : Deformation Modes in 6
: Mechanical Properties 6
Ni_3Mn: Deformation Modes in 6
Ni_3Nb: Mechanical Properties 6
NiO : Reduction by Nitrogen 27
: Solid-Phase Reaction with NiS or Ni_3S_2 177
NiSi, Ni_2Si } Influence of Temperature on 5
Ni_3Ta, Ni_3Ti } Mechanical Properties 6
Nickel Complex Analogous to Cobalt Carbonyl 117
Nickel Formate: Kinetic Study of Thermal Decomposition 213
Rare-Earth Compounds with the $MgCu_2$ Structure 10
Rubber: Protection Against Atmospheric Agents by Addition of Nickel Compounds 177
Ti_2Ni-type Phases Containing Titanium, Zirconium or Hafnium 87
Titanium-Nickel System Between Ti_2Ni and TiNi 249
Yttrium-Nickel System: Intermetallic Compounds and Eutectics 10

ELECTRODEPOSITION AND OTHER COATING METHODS

(*See also* **HEAT- AND CORROSION-RESISTING MATERIALS: Clad, Faced and Lined Materials**)

Analysis of Solutions and Effluents

Determination of Nickel in Waste Effluents from Plating Operations 147
Determination of Zinc in Nickel Electrolytes 248

Electrodeposition of Alloys, and Properties of Electrodeposited Alloys

Cobalt-Nickel Alloys
: Deposition from Sulphamate Solutions 61, 182
: Electrodeposition and Magnetic Properties 61
Iron-Chromium-Nickel Alloys Approximating to the Composition of 18-8 Stainless Steel 32
Iron-Nickel Alloys: Influence of Thiourea on Deposition 246
'Monel' 90
Nickel-Cobalt Alloys
: Deposition from the Pyrophosphate Solution 90
: Development of Process Suitable for Plating Moulds 32
: Influence of Plating Temperature on Properties 57
Nickel-Copper Alloys 118
Nickel-Iron Alloys 247
Nickel-Tungsten Alloys 119
Nickel-Zinc Alloys 32
Pyrophosphate Solutions for Deposition of
: Nickel-Cobalt Alloys 90
: Nickel-Copper Alloys 118
: Nickel-Iron Alloys 247
: Nickel-Tungsten Alloys 119
: Nickel-Zinc Alloys 32
: Tin-Nickel Alloys 292

Electrodeposition of Nickel, and Properties and Uses of Electrodeposited Nickel

(*See also* **Specifications** and **Testing**)

Accelerated-Corrosion Testing: *see* 'Corrosion Testing', below
Activated Carbon: Bright-Nickel-Plating Solutions Suitable for Filtering through 31
Addition Agents
: Brightening and Levelling Characteristics 32, 56, 88, 179, 245, 246
: Influence on Composition 88
: „ „ Corrosion Behaviour 180
: „ „ Deposition Rate 179, 246
: „ „ Ductility 89
: „ „ Stress 179
Adhesion of Electrodeposited Nickel: Influence of Surface Preparation 30
Aluminium and its Alloys: Nickel Plating of 29, 89
Anodes and Electrolytes: Reactions in Nickel Plating 30
Anodes, Nickel-Ball Plating 215
A.R.D.E. Smoothing Process 69
Atmospheric-Corrosion Testing: *See* 'Corrosion Testing', below
Barrel Plating 8, 31, 57
Brightening Agents: *See* 'Addition Agents' above
Cadmium Plating from Cyanide Solutions Containing a Nickel Salt 89
Can-Making Industry: Use of Electrodeposited Nickel as an Undercoating for Organic Finishes 58
Chromium Overcoatings: Deposition and Properties (*See also* 'Quality of Coatings', below)
: Crack-Free 8, 28, 59, 60, 213, 242, 243, 291
: Double-Layer 8, 28, 59, 60, 146, 213, 242, 243
: Microcracked 213, 242, 243
: Sandwich 8, 28, 60, 213, 243
Cleaning Techniques in the Electronic Industry of Interest to Platers 56
Composition of Nickel Deposits: Influence of Addition Agents 88
Compressor Blades in Hardenable Stainless Steel: Direct Plating with Nickel 31
Corrosion Protection: Symposia and Reviews 8-9, 87, 145, 146, 178, 213, 242-5, 283-9, 291
Corrosion Testing 8, 9, 28, 29, 30, 58, 59, 60, 87, 89, 91, 117, 135, 180, 181, 213, 241, 242, 243, 244, 288

Page
Design for Electroplating 290
Direct Nickel Plating of Hardenable Stainless Steel from the Sulphamate Solution 31
Double-Layer-Nickel Plating and Properties of Double-Layer Nickel (*See also* 'Quality of Coatings', below) 8, 28, 29, 58, 59, 60, 87, 117, 146, 180, 181, 213, 216, 242, 243, 244, 245, 290
Duplex-Nickel Plating: *See* 'Double-Layer-Nickel Plating', above
Electrochemical Reactivities of Various Nickel Electrodeposits 180
Electrolytic Pre-Plating Treatment of Substrates (Including Nickel Coatings): Application of Faraday's Laws 62
Enamelling Industry: Purpose, Theory and Application of Nickel Dip 119, 217
European Plating Practice 87
Fatigue Strength of Hardenable Stainless Steel: Influence of Direct Nickel Plating from the Sulphamate Solution 31
Fatty Acids: Adhesion of Nickel on Substrates Contaminated with 58
Fluorine: Resistance to Corrosion by 48
Hardness of Electrodeposited Nickel: Influence of Surface Preparation 30
Heavy Nickel Plating of Steel: Pre-Plating Procedures 62
Hydrogen Embrittlement of High-Strength Steels: Influence of Nickel Plating prior to Cadmium Plating 68
Introduction to Nickel Plating 290
Levelling 8, 56, 179, 242, 245, 289
Literature Review: Developments in 1960 28
Molybdenum: Protection from High-Temperature Oxidation by Nickel/Chromium Plating 90
Nickel-Coated Copper Wire for Use in Electrical Equipment 145
Nickel Dip: Rôle in One-Coat Enamelling 119, 217
Nickel: Preparation for Electroplating with Nickel 144
Organic Enamels: Adhesion of Electrodeposited Nickel to 58
Phosphoric Acid: Suitability as an Etching Medium in Electroplating 146
Porosity in Electrodeposits
: Causes and Detection 180
: Magnetic Method of Detecting Corrosion Currents Associated with 91
Potential, Galvanic and Polarization Data: Corrosion of Nickel/Chromium Coatings 58
Pre-Plating Treatment of the Steel Substrate: Influence on Corrosion-Resistance of Nickel Deposits 214
Pre-Plating Treatment of Substrates: Application of Faraday's Laws 62
Present Status of Decorative Nickel/Chromium Coatings 213
Quality Labelling Scheme for Nickel/Chromium Plating 87, 284
Quality of Nickel/Chromium Coatings: Influence of Chromium and the Underlay 8, 9, 29, 58, 59, 60, 117, 145, 146, 180, 181, 213, 241, 242, 243, 244, 289, 291
Recovery of Nickel and Chromium in the Electroplating Industry 87
Sandwich Coatings 8, 28, 60, 213, 243
Screws and Bolts: Industrial Plating 147
Strength of Electrodeposited Nickel: Influence of Surface Preparation 30
Stress in Electrodeposited Nickel 30, 179
Sulphur: Influence in Nickel Deposits 8, 58, 180, 213, 242, 290
Surface Preparation 30, 61, 62, 144, 214
Temperature of Plating: Influence on Properties of Bright-Nickel Deposits 57
Thickness of Nickel Coating
: Application of Statistical Quality Control 57
: Influence on Corrosion Protection 8, 29, 59, 213, 242, 284, 285, 288
: Measurement 8, 30, 91, 216, 247
Thin Nickel Coatings: Properties 245
Thiourea: Influence on the Deposition Reactions of Iron and Nickel 246
Throwing Power: Electrodeposition of Nickel in Narrow Crevices 291
U.S.A.: Decorative Nickel/Chromium Plating in 242

General

Cleaning Techniques in the Electronics Industry Relevant to Plating 56
Design for Electroplating 290
Enamelling Industry: Purpose, Theory and Application of Nickel 119, 217
Introduction to Nickel Plating 290
Plating Developments in 1960: Literature Review 28
Quality Labelling Scheme for Nickel/Chromium Plating 87, 284
Symposium on Nickel/Chromium Plating 8-9, 178

Other Coating Methods (*See also* HEAT- AND CORROSION-RESISTING MATERIALS: Clad, Faced and Lined Materials)

Addition Agents: Influence on the Deposition Rate and Brightness of Electrolessly Deposited Nickel Coatings 179, 246
Deposition of Nickel from a Liquid-Metal Solution 246
Electrolessly Deposited Nickel Coatings
: Influence of Addition Agents on Deposition Rate and Brightness 179, 246
: Influence of Heat-Treatment 88
Hardness of Electrolessly Deposited Nickel: Influence of Heat-Treatment 88
Nickel-Phosphorus Alloys: Electroless Deposition from Pyrophosphate Solutions 60
Scoring by Metals: Influence of Plating with Nickel-Phosphorus Alloy 70

Plating of Nickel-containing Materials

Plating of Nickel-containing Materials by Deposition of Nickel from Liquid-Metal Solutions 246
Preparation of 'Hastelloy C', 'Stellite' and Nickel-Plated Basis Metals Prior to Nickel Plating 62
Preparation of Nickel for Electroplating with Nickel 144

Specifications

A.S.T.M. Specifications for Decorative Nickel/Chromium Plating 285
Belgian Standard for Nickel/Chromium Plating 286
Copper-Accelerated Acetic-Acid/Salt-Spray Test: A.S.T.M. Specification 216
Double-Layer-Nickel/Chromium Coatings: A.S.T.M. Specification 216
Factors Involved in Meeting Specifications 9
French Standards for Metallic Coatings and Surface Treatments 287

Page

French Standard on Nickel/Chromium Plating: Revision of 287
International Standards for Metallic Coatings 284
Labelling Scheme for Nickel/Chromium Plating 87, 284
Nickel-Coated Copper Wire for Use in Electrical Equipment: *A.S.T.M. B*355-60*T* 145
Preparation of Nickel for Electroplating with Nickel: *A.S.T.M. B*343-60*T* 144
Standardization of Surface Treatments for Metallic Materials: Symposium 283-9
Swiss Standards on Nickel/Chromium Plating 287

Testing

Accelerated-Corrosion Testing
: Acetic-Acid/Salt-Spray Test 117, 288
: Copper-Chloride-Modified Acetic-Acid/Salt-Spray Test 9, 59, 60, 117, 213, 216, 242, 288
: Correlation with Atmospheric and Service Tests 213, 243, 289
: 'Corrodkote' Test 9, 29, 117, 213, 242, 288, 289
: Ferroxyl Test 242, 288
: General 59, 135, 241
: Kesternich Test 213, 242, 244, 288, 289
: Salt-Spray Test 9, 213
: Sulphur-Dioxide Test 9, 117, 213, 288
Atmospheric-Corrosion Testing
: Correlation with Accelerated-Corrosion Testing 118, 213, 243, 289
: Correlation with Electrode-Potential Studies 58, 117
: General 29, 59, 60, 135
: In Tropical Atmospheres 135
: Metallographic Studies 89, 117, 181
Cathode Overpotential During Electrodeposition: Measurement of 91
Corrosion Currents Associated with Pores or Pits in Coatings: Magnetic Method of Detection 91
Corrosion Testing (*See also* 'Accelerated-Corrosion Testing' and 'Atmospheric-Corrosion Testing', above) 8, 9, 28, 29, 30, 58, 59, 60, 87, 89, 91, 117, 135, 180, 181, 213, 241, 242, 243, 244, 288
Corrosion Testing of Nickel/Chromium Coatings in the Car Industry 9, 59, 288, 289
Electrolyte Constituents: Application of Statistical Quality Control 57
Levelling Power: Measurement of 56, 289
Nickel-coated Copper Wire: Determination of the Weight of the Coating 145
Porosity in Electrodeposits
: Detection of 180
: Magnetic Method of Detecting Corrosion Currents Associated with 91
Statistical Quality Control: Application to Nickel-Plating Solutions 57
Stress: Measurement of 30
Tensile Testing of Nickel-Plated Specimens 30
Thickness Testing
: B.N.F.M.R.A. Coulometric Thickness Meter 216
: B.N.F.M.R.A. Thermoelectric Gauge 247
: Calorimetric Measurement 91
: 'Dermitron' Thickness Tester 288
: Electrolytic-Stripping Method 30, 92
: 'Magnegage' Thickness Tester 9

Page

NON-FERROUS ALLOYS

(*See also* **HEAT- AND CORROSION-RESISTING MATERIALS**)

Analysis

(*See also* **NICKEL: Analysis and Determination**)

Cobalt: Spectrophotometric Determination of Major Amounts in Nickel Alloys 184
Cobalt and Nickel: Voltammetric Determination in Hard Magnetic Alloys 148
Copper: Rapid Spectrophotometric Determination in Non-Ferrous Alloys 149
Nickel: Determination in Copper Alloys 85
Ring-Oven Technique: Analysis by 10
Solids Mass Spectroscopy 82
X-Ray Fluorescence Spectroscopy 82

Composition, Constitution, Structure

Copper-Nickel Alloys
: Influence of Magnetic Clusters on Specific Heat 293
: Rates of Solution in Lead 143
: Surface Diffusion during Sintering of Nickel and Copper Powders 213
: Surface Tension and Contact Angles on Titanium Carbide 13
Chromium-Nickel System: Determination of Chromium and Nickel Solvuses 120
Gadolinium-Nickel System 249
Gold-Nickel Alloys: Lattice Spacing and Densities 148
Gunmetals
: Influence of Metal/Mould Reaction on Properties 120
: Influence of Nickel on Structure and Properties 120, 293
Intermediate Temperature Ductility Minimum: Structural Factors 248
Lead
: Influence on Machinability of Nickel Silvers 182
: Influence of Nickel and Cadmium on Recrystallization Characteristics and Creep Resistance 183
: Rates of Solution of Copper-Nickel Alloys in 143
Metal/Mould Reaction: Influence on Nickel-containing Gunmetals 121
Nickel: Influence on Gunmetal Castings 120, 293
Nickel-Aluminium Bronze: Relationship between Aluminium Content, Microstructure, Mechanical Properties and Weldability 92
Nickel-Aluminium-Nitrogen System 249
Nickel-Cadmium-Nitrogen System 249
Nickel-Chromium Alloys: Magnetostriction and Crystal Anisotropy 92
Nickel-Copper Temperature-Compensation Alloys: Influence of Manganese on Magnetic Properties 94
Nickel-Magnesium-Nitrogen System 249
Nickel Silvers: Influence of Lead Additions on Machinability 182
Nickel-Tin Stable and Unstable Solid-Solution Alloys: Influence of Tin Content on Age-Hardenability 294
Nickel-Vanadium Alloys: Magnetostriction and Crystal Anisotropy 92
Nickel-Zinc-Carbon System 148
Nickel-Zinc-Nitrogen System 249
Nitrogen: Solubility in Liquid Nickel-Chromium Alloys 83
Phosphorus: Influence on Gunmetals 120
'Silnic' Bronze: Structure and Properties 249

Page

Specific Heats of Copper-Nickel Alloys: Influence of Magnetic Clusters 293
Surface Diffusion during Sintering of Non-Compacted Mixtures of Nickel and Copper Powders 213
Temperature Compensation of Electrical Instruments: Influence of Alloying Additions on Nickel-Copper Alloys 94
Titanium-Nickel Alloys: Structure and Properties 9
Titanium-Nickel System between Ti_2Ni and TiNi 249
Yttrium-Nickel System 10

Powder Production and Uses

(*See also* HEAT- AND CORROSION-RESISTING MATERIALS: Powder Production and Uses)

Lead: Dispersion Hardening by Nickel and Cadmium 183
Nickel Silvers: Pressing and Sintering 182
Surface Diffusion during Sintering of Non-Compacted Mixtures of Nickel and Copper Powders 213
Temperature Compensation of Electrical Instruments: Development of Nickel-containing Alloys 94

Production and Processing

(*See also* ELECTRODEPOSITION: Electrodeposition of Alloys)

Centrifugal-Casting Technique for Production of Hollow Castings 282
Cold Heading 19
Fabrication and Processing: Recent Developments 43
Gunmetals: Influence of Metal/Mould Reaction 120
Lead-Cadmium-Nickel Alloys: Production 183
Melting Procedures for Nickel-Copper and Nickel-Chromium-base Alloys 239
Nickel Silvers: Pressing and Sintering 182
Power-Line Poles: Sheathing with Cupro-Nickel Sheet 171
'Silnic' Bronze: Influence of Working and Heat-Treatment on Structure and Properties 249

Properties

(*See also* Specifications)

Anodic Polarization and Passivity of Nickel-Copper Alloys 212
Chromium-Nickel System: Thermodynamics 33
Cold-Heading Characteristics 19
Condensing Heat-Transfer Rates of Nickel-containing Condenser-Tube Materials 256
Condenser-Tube Alloys
: Corrosion Problems in the Royal Canadian Navy 132
: Corrosion under Conditions of Local High Temperature 132
Cupro-Nickels
: Condensing Heat-Transfer Rates of Condenser Tubing 256
: Corrosion Behaviour in Sea Water 108, 310
: Corrosion of Condenser Tubing Under Conditions of Local High Temperature 132
: Corrosion of Feed-Water Tubes in C.E.G.B. Stations 132

Page

Cupro-Nickels—*contd.*
: Economic Considerations in Selection for Marine Applications 170
: Intermediate Temperature Ductility Minimum 248
: Low-Temperature Properties 47, 54
: Stress-Corrosion Resistance 199
: Suitability for Fin Drums Drying Calcium-Carbonate Paste 121
: Suitability for Protection of Power-Line Poles from Marine-Borer Attack 171
Ferromagnetism of Nickel-Copper Alloys 148
Gunmetal Castings
: Influence of Nickel, Metal/Mould Reaction and Section Thickness on Properties 120, 293
: Specification Requirements 217
Impingement Attack on Non-Ferrous Tubular Condenser and Heat-Exchange Equipment 132
Intermediate Temperature Ductility Minimum in 'Monel' and Cupro-Nickel 248
'Kunifer' Alloys: Low-Temperature Properties 47
Lead-Cadmium-Nickel Alloys: Properties 183
Low-Temperature Properties 47, 54
Magnetostriction and Crystal Anisotropy of Nickel-Chromium and Nickel-Vanadium Alloys 92
Manganic Nickel: Yield-Point Phenomena 62
Marine Service: Economic Considerations in Selection of Materials 170
Nickel-Aluminium Bronze
: Cavitation-Erosion Resistance 309
: Corrosion Behaviour in Sea Water 108
: Economic Advantages in Marine Applications 171
: Low-Temperature Properties 54
: Relationship between Aluminium Content, Microstructure, Mechanical Properties and Weldability 92
Nickel-Chromium Alloys: Magnetostriction and Crystal Anisotropy 92
Nickel-Copper Alloys:
: Anodic Polarization and Passivity in Sulphuric Acid 212
: Ferromagnetism 148
: Specific Heats 293
: Temperature Compensation of Electrical Instruments 94
Nickel Silvers
: Creep and Rupture Properties 220
: Low-Temperature Properties 54
: Mechanical Properties and Machinability of Sintered Alloys 182
: Yield-Point Phenomena 62
Nickel-Tin Stable and Unstable Solid-Solution Alloys: Creep and Fracture 294
Nickel-Vanadium Alloys: Magnetostriction and Crystal Anisotropy 92
Physical Properties of Nickel-base Alloys 154
Sea-Water Corrosion Behaviour of Non-Ferrous Materials 108, 310
'Silnic' Bronze: Structure and Properties 249
Specific Heats of Nickel-Copper Alloys 293
Stress-Corrosion Cracking: Resistance of Copper-base Alloys 199
'Superston 40' : Low-Temperature Properties 47
Surface Tension and Contact Angles of Copper-Nickel Alloys on Titanium Carbide 13
Temperature Compensation of Electrical Instruments: Properties of Nickel-Copper-base Alloys 94
Thermodynamics of the Chromium-Nickel System 33
Titanium-Nickel Alloys: Relationship with Structure 9
Yield-Point Phenomena in Nickel-containing Alloys 62

Page

Specifications and Testing

Copper-Alloy Ingots and Castings: *B.S.* 1400:1961 217
Copper-Alloy Integral-Finned Seamless Condenser and Heat-Exchanger Tubes: *A.S.T.M. B*359-60 148
Copper Alloys: Analysis: *B.S.* 1748: 1961 85
Copper-Nickel Alloy Castings: A.S.T.M. Specification 220
Copper-Nickel Hardener in Ingot, Slab and Shot Form: *A.S.T.M. B*358-60*T* 147
Gunmetals
: Specification Requirements 217
: Tensile Tests on Large-Size Test Bars 120
Stress-Corrosion-Cracking Test for Copper-base Alloys 199

Uses

(*For* Uses in Nuclear-Energy Plant and in Brazing Alloys, *see* **HEAT- AND CORROSION-RESISTING MATERIALS: Uses)**

Coinage 62, 248
Copper-Nickel Hardener 147
Fin Drums Drying Calcium-Carbonate Paste: Use of Cupro-Nickel 121
Heat-Exchange Equipment 132, 148, 256
Keys for Tumbler Locks: Use of Sintered Nickel Silvers 182
Magnetic Alloys 148
Marine Applications 92, 108, 170, 171, 220
Moulds: Electrodeposition of Nickel-Cobalt Alloys for 32
Power-Line Poles: Use of Cupro-Nickel Sheathing 171
Pressure Applications 120, 220, 293

Welding, Brazing and Soldering

Cupro-Nickel: Corrosion-Resistance of Welded Fin Drums Drying Calcium-Carbonate Paste 121
Nickel-Aluminium Bronze: Relationship between Aluminium Content, Microstructure, Mechanical Properties and Weldability 92
Overlaying with the Gas-Shielded Process 51

NICKEL-IRON ALLOYS

Analysis

Determination of Nickel in Ferrous and Ferromagnetic Materials 86

Composition, Constitution, Structure and Properties (*excluding* Magnetic Properties, *q.v.*)

Anodic-Polarization Behaviour in Sulphuric-Acid Solutions 194
Electrodeposition from the Pyrophosphate Solution 247
Glass-to-Metal Sealing Alloys
: Influence of Copper on Expansion Characteristics of Iron-Nickel-Cobalt Alloys 221
: Nickel-Iron-Manganese Alloy for Use in Microwave Tubes 33
Iron-Nickel-Gold Ternary System 250
Iron-Nickel-Silicon System: Occurrence of Sigma Phase 250
Low-Temperature Mechanical Properties 54
Nickel: Diffusion in Iron 176
Nitrogen: Solubility in Liquid Nickel-Iron Alloys 83, 251

Magnetic Properties and Uses of Magnetic Alloys

Conference on Magnetism and Magnetic Materials 184
Curie Temperature of Iron-Nickel Alloys: Influence of Hydrostatic Pressure 93
Ductile Permanent-Magnet Materials 94
High-Field Elastic Constants of an Iron-Nickel Alloy: Temperature-Dependent Magnetic Contributions 82
Hydrostatic Pressure
: Influence on Curie Temperature 93
: Magnetization under 185
'Invar': Thermal and Magnetic Analysis 33
Magnetic Materials in the Electrical Industry: Handbook 149
Magnetization Reversal in Thin Nickel-Iron Films 11
Magnetization under Hydrostatic Pressure 185
Permeability of Nickel-Iron Alloys: Influence of Heat-Treatment 251
Stability of Permanent-Magnet Materials 221
Temperature Compensation of Electrical Instruments: Influence of Alloying Additions on Iron-Nickel Alloys 94

Powder Production

Temperature Compensation of Electrical Instruments: Sintered Iron-Nickel Alloys 94

Production and Processing

Electrodeposition of Nickel-Iron Alloys from the Pyrophosphate Solution 247
Heat-Treatment of Nickel-Iron Alloys: Influence on Permeability 251
Temperature Compensation of Electrical Instruments: Influence of Heat-Treatment and Production Method on Nickel-Copper Alloys 94

Testing

Magnetization-Reversal Process: Study Using the Kerr Magneto-Optic Effect 11
Thermal and Magnetic Analysis of 'Invar': Electron-Beam Technique for 33

CAST IRON

Analysis

Combined Method for Analysis of High-Alloy Irons 80
Determination of Nickel in Ferrous Materials 86
Mould for Simultaneous Sampling of Metals for Spectrographic and Chemical Analysis 12

General — Page

Acicular Cast Iron: Properties 63
Alloy Cast Irons
: Review of Properties 63
: Scoring Characteristics 70
Low-Temperature Properties 54
Nickel-Chromium Cast-Iron Bar: Production, Properties and Applications 33
'Nicrosilal': Properties 63
'Ni-Hard'
: Centrifugal-Casting Technique for Production of Grinding Balls 282
: Impact-Fatigue Life of Grinding Balls 34
: In Crushing and Grinding Plant 122
: Properties 63, 294
'Ni-Resist'
: Fluidity and Casting Quality 193
: Resistance to Chlorohydrocarbons 77
Welding of Cast Iron
: Flash Welding 266
: Repair Welding 186

Spheroidal-Graphite Cast Iron

Alloying Additions: Influence on Properties 294
Heat Treatment
: Kinetics of Thermally-Activated Transformations 186
: Structural Changes during 11
Hot-Hardness 64
Low-Temperature Properties 54
Magnetic Properties 251
Pitting of Diesel Cylinder Liners: Resistance of Low-Alloy and Austenitic S.G. Irons 151
Scoring Characteristics 70
'S.G. Ni-Resist': Properties and Applications 63
Specifications
: Austenitic S.G. Iron Castings: *A.S.T.M. A439-60T* 150
: Ferritic S.G. Iron Castings for Valves, Flanges or Piping Components: *A.S.T.M. A455-60T* 149
: Spheroidal-Graphite Iron Castings: *B.S.* 2789: 1961 222
Steel Mills: Applications of S.G. Iron 150
Thermal-Fatigue Resistance of S.G. Iron 126
Tin: Influence on the Mechanical Properties of Pearlitic Spheroidal-Graphite Iron 95
Welding
: Heat-Affected Zone of Arc-Welded S.G. Iron: Structure and Hardness Studies 35
: Welding of S.G. Iron without Post-Weld Annealing 295

CONSTRUCTIONAL STEELS

Analysis

Boron: Spectrophotometric Determination in Steels 193
Mould for Simultaneous Sampling of Metals for Spectrographic and Chemical Analysis 12
Nickel: Determination in Ferrous and Ferromagnetic Materials 86
Ring-Oven Technique for Sorting Steels 10

Composition, Constitution and Structure — Page

9 per cent. Nickel Steel in Heavy Sections: Influence of Carbon on Properties; Structural Factors 255
13 per cent. Nickel Martensitic Steel: Metallographic Study 152
25 per cent. Nickel Age-Hardening Steels: Composition and Structural Factors 37
'300M' Steel: Influence of Melting Method on 'Cleanliness' 35, 36
Bainite: Structure in Nickel-containing Hypoeutectoid Steels 122
Carbon: Influence on the Properties of High-Strength Steels 151, 307
'Cleanliness' and Quality: Influence of Vacuum Melting 35, 36, 64, 155
Cold Working: Influence on Structure 65
500°F. Embrittlement: Influence of Rapid Tempering on Susceptibility to; Structural Changes 67
Glassing Characteristics: Relationship with Composition 253
Heat-Affected-Zone Cracking: Relationship with Composition 253
'HY-80': Flux and Filler-Wire Studies 296
Hydrogen Embrittlement 12, 35, 68, 69
Ingot Macrostructure: Influence of Silicon and Manganese Contents 187
Low-Temperature Properties: Influence of Composition and Structure 54, 65, 96
Magnetic Properties: Influence of Alloying Additions 252
Manganese: Influence on Macrostructure of Ingots 187
Manganese-Nickel-Chromium-Molybdenum Steel: Microstructure and Properties 95
Martensite, Tempered: Toughness 36
Metastable Austenite: Changes prior to Transformation 153
Nickel
: Influence on Atmospheric Corrosion of Steels 135
: Influence on the First-Stage of Tempering in High-Carbon Martensitic Steels 36
: Influence on Magnetic Properties of Cast Steel 252
: „ „ Properties of High-Strength Steels 151
: „ „ Properties of Sintered Steels 223
'Nitralloy N': Mechanism of Age Hardening 295
Nitrogen: Solubility in Liquid Iron-Nickel Alloys 83
Non-Magnetic Steels: Influence of Composition on Properties 152
Phosphorus: Influence on Hot Cracking in High-Strength-Steel Weld Metals 96
Pre-Straining and Re-Tempering: Structural Effects in Quenched-and-Tempered Steel 187
Silicon
: Influence on Macrostructure of Ingots 187
: Influence on Properties of High-Strength Steels 151
Sintered Steels: Influence of Nickel and Carbon 223
Size Effects in Notched Bend Tests: Structural and Compositional Factors 65
Sulphur: Influence on Hot Cracking in High-Strength-Steel Weld Metals 96
Tempering of High-Carbon Steel: Influence of Alloying Additions 36
Thermal-Fatigue Resistance of Nickel-containing Steels: Rôle of Phase Changes 126
Upper and Lower Critical Temperatures: Calculation from Composition 186

Page

Plating

Cadmium Plating: Effect on Properties, Improved Techniques, etc. 68, 69
Nickel Plating Prior to Cadmium Plating: Effect on Susceptibility of High-Strength Steels to Hydrogen Embrittlement 68

Powder Production

Nickel-containing Sintered Steels 223

Production and Processing
(*See also* Welding)

9 per cent. Nickel Steel
: Heat-Treatment of Cast Steel 223
: Influence of Heat-Treatment on Low-Temperature Properties of Welded Pressure Vessels Tested to Destruction 66, 67
: Influence of Heat-Treatment on Low-Temperature Properties in Heavy Sections 255
13 per cent. Nickel Martensitic Steel: Influence of Heat-Treatment 152
18 per cent. Nickel-Cobalt-Molybdenum Steel: Workability 115
25 per cent. Nickel Age-Hardenable Steels for High-Strength Applications: Heat-Treatment and Processing 37
'300M' Steel: Influence of Melting Method on Properties 35, 36
Aeronautical Components: Production Requirements for Castings 38
A.R.D.E. Smoothing Process: Application to Low-Alloy Steels 69
Chemical Milling 55
Cold Heading 19
Cold Working
: Influence on Properties of Non-Magnetic Steels 152
: Influence on Structure and High-Temperature Strength 65
Critical Temperatures: Formulae for Calculation of Upper and Lower Critical Temperatures 186
Heat-Treatment 36, 37, 38, 39, 65, 66, 67, 95, 115, 122, 151, 187, 223, 254, 255, 295
Hollow Castings: Production by Centrifugal-Casting Technique 282
Low-Temperature Properties of Ferrous Materials: Influence of Design, Fabrication, and Heat-Treatment 54, 65, 66, 95, 152, 223, 255
Manganese-Nickel-Chromium-Molybdenum Steel: Influence of Heat-Treatment 95
Mar-Ageing Treatment of 18 per cent. Nickel-Cobalt-Molybdenum Steel 115-16
Milling of High-Strength Steels 38, 55
'Nitralloy N': Mechanism of Age Hardening 295
Nitriding Steel (Nickel-Aluminium Age-Hardening): Heat-Treatment 122
Pre-Straining and Re-Tempering: Influence on Quenched-and-Tempered Steel 187
Sintered Steels, Nickel-containing: Production of 223
Tempering (*See also* 'Heat-Treatment', above)
: Influence of Alloying Elements on the First Stage of Tempering in High-Carbon Steels 36
: Influence of Rapid Tempering on Susceptibility to 500°F. Embrittlement 67
: Influence on Toughness of Martensitic Steel 36

Page

Two-Stage Isothermal Treatment of Nickel-Chromium-Molybdenum-Copper Steel 153
Vacuum Melting: Practice and Effect on Properties 35, 36, 64, 155
Working of Low-Alloy Steels: Recent Developments 43

Properties and Uses
(*See also* Specifications)

9 per cent. Nickel Steel for Low-Temperature Service
: Cast Steel: Production and Properties 223
: Comparison with 13 per cent. Nickel Steel 152
: General 47, 95, 96, 188
: Influence of Heat-Treatment on Low-Temperature Properties of Welded Pressure Vessels 66
: Properties in Heavy Sections 255
: Susceptibility to Temper Embrittlement 255
13 per cent. Nickel Martensitic Steel: Mechanical Properties at Liquid-Air Temperatures; Comparison with 9 per cent. Nickel Steel 152
25 per cent. Nickel Age-Hardenable Steels for High-Strength Applications: Properties 37
'300M'
: Influence of Melting Method on Properties of Bar and Sheet 35, 36
: Low-Temperature Properties 305
: Properties of Welded Sheet 254
Aeronautical Applications of Steel Castings 38
A.R.D.E. Smoothing Process: Response of Nickel-containing Steels to 69
Atmospheric Corrosion of Nickel-containing Steels 135, 233
Boiling-Water Reactor System: Corrosion of Low-Alloy Steels in 188
Cold-Headed Steel: Characteristics 19
Cold-Worked Steel: High-Temperature Strength 65
Corrosion of Low-Alloy Steels in Boiling-Water Reactor Systems 188
'Cor-Ten': Corrosion in Fuel Gas from an Oil-Fired Furnace 15
Critical Temperatures: Formulae for Calculation of Upper and Lower Critical Temperatures 186
Dilatometric Characteristics of Low-Alloy Welded Steels 295
Dynamic Moduli of Elasticity of Low-Alloy Steels at Elevated Temperatures 227
Electrical Equipment: Magnetic Properties of Nickel-containing Cast Steel 252
500°F. Embrittlement: Influence of Rapid Tempering on Susceptibility to 67
Flow and Fracture Characteristics at Low Temperatures 65
Glassing Characteristics of Low-Alloy Steels 253
Heat-Affected-Zone Cracking in Steels: Formula for Prediction of Susceptibility to 253
High-Strength Steels
: 25 per cent. Nickel Age-Hardenable Steel 37
: Compositional Variations: Influence on Properties 151
: Corrosion
Atmospheric Corrosion 135
In Boiling-Water Reactor Systems 188
Stress Corrosion of Oil-Well Tubing 18
: Dilatometric Characteristics 295
: Hot Cracking 96
: Hydrogen Embrittlement 12, 68, 69
: Low-Temperature Properties 37, 65, 303, 304, 305

Page

High-Strength Steels—*contd.*
: Mar-Ageing Nickel-Cobalt-Molybdenum Steel 115
: Milling 38
: Nickel-Aluminium Age-Hardening Nitriding Steel 122
: Pre-Straining and Re-Tempering Effects 187
: Sintered Steels 223
: Use
In Aeronautical Applications 38
In Bridges 39
For Impeller Wheels 39
In Rockets 39, 254
: Vacuum-Melted Steels 35, 36, 64
: Welded Steels 39, 96, 115, 154, 254, 295, 296
'HY-80'
: Crack Sensitivity of Welds 154
: Properties of Submerged-Arc Welds 296
Hydrogen Embrittlement 12, 35, 68, 69
Hydrogen, Liquid: Suitability of Nickel-containing Steels for Use with 303
Impeller Wheels: Use of High-Strength Steel for 39
Isothermal Transformation Diagram for Nickel Chromium-Molybdenum-Copper Steel 153
Low-Temperature Properties and Service 37, 38, 47, 54, 65, 66, 95, 96, 151, 152, 188, 223, 255, 305
Magnetic Properties of Nickel-containing Cast Steel 252
Manganese-Nickel-Chromium-Molybdenum Steel: Properties 95
Mar-Ageing 18 per cent. Nickel-Cobalt-Molybdenum Steel: Properties 115-16
Nickel-Chromium-Molybdenum-Copper Steel: Isothermal Transformation Diagram 153
'Nitralloy N': Mechanism of Age Hardening 295
Nitriding Steel (Nickel-Aluminium Age-Hardening): Mechanical Properties 122
Non-Magnetic Steels: Mechanical Properties 152
Notch Characteristics 12, 35, 37, 38, 65, 66, 67, 68, 95, 115, 122, 151, 152, 187, 223, 255, 296, 307
Pressure Vessels in 9 per cent. Nickel Steel: Low-Temperature Tests 66
Pre-Strained and Re-Tempered Quenched-and-Tempered Steel: Properties 187
Scoring Characteristics 70
Section Size: Influence on Properties of 9 per cent. Nickel Steel 255
Sintered Nickel-containing Steels: Properties 223
Stress Concentration: Influence on the Tensile Strength of Nickel-containing Steel Sheet at Various Temperatures 304
Stress Corrosion of High-Strength Nickel-containing Steel Used for Oil-Well Tubing 18
'T-1': Use in Bridges 39
Temper Embrittlement: Susceptibility of 9 per cent. Nickel Steel to 255
Tempered Martensite: Toughness 36
Tempering in High-Carbon Martensitic Steels: Influence of Alloying Elements 36
Thermal-Fatigue Resistance of Nickel-containing Steels 126
Vacuum-Melted Steels: Properties 35, 36, 64, 155

Specifications and Testing

Crack Sensitivity of Welds in 'HY-80' Steel: Test for Evaluation of 154
Critical Temperatures: Formulae for Calculation of Upper and Lower Critical Temperatures 186
Determination of Proof Stress, Rupture Strength and Creep Strength at Elevated Temperatures: *B.S.* 3228: 1960 69
Dynamic Moduli of Elasticity: Determination at Elevated Temperatures 227
Glassing Characteristics of Nickel-containing Low-Alloy Steels: Evaluation Tests 253
Hydrogen-Embrittlement Test 68
Notch-Toughness Tests for Welded Steel 38
'Operation Cryogenics': Low-Temperature Tests on Pressure Vessels Welded from 9 per cent. Nickel Steel 66
Scoring Characteristics: Apparatus for Study of 70
Thermal-Fatigue Test 126

Welding

9 per cent. Nickel Steel: Influence of Heat-Treatment on Toughness of Welds 66
'300M' Sheet
: Tests on Welded Pressure Vessels 36
: Welding of Missile Motor Cases 254
Bridges: Welding of Low-Alloy Steel for 39
Cracking
: Crack Sensitivity of Welds in 'HY-80' Steel 154
: Heat-Affected-Zone Cracking in Steels: Formula for Prediction of Susceptibility 253
: Hot Cracking in High-Strength-Steel Weld Metals 96
Dilatometric Characteristics of Nickel-containing Low-Alloy Welded Steels 295
'HY-80'
: Evaluation of Electrodes for 154
: Fluxes and Filler Wires for Submerged-Arc Welding 296
Impeller Wheels: Fabrication from High-Strength Steel by Welding 39
Low-Temperature Plant: Welded Steel Sheet for 95
Low-Temperature Properties: Influence of Welding 54
Mar-Ageing 18 per cent. Nickel-Cobalt-Molybdenum Steel: Weldability 115-16
Notch-Toughness Tests for Welded Steel 38
Pressure Vessels Welded from 9 per cent. Nickel Steel: Influence of Heat-Treatment on Toughness 66
Radar Equipment for Arctic Service: Welding of Nickel-Steel Components 38
Rocket Cases: Welding of High-Strength-Steel Sheet 39
'T-1': Welding for Bridges 39
Welding Variables: Influence on the Yield Strength of Low-Alloy-Steel Weld Metals 254
Yield Strength of Weld Metal: Influence of Welding Variables 254

HEAT- AND CORROSION-RESISTING MATERIALS

Analysis and Identification

Analysis of High-Alloy Steels 80
Chi Phase: Identification in Stainless Steel 18
Determination of
: Boron in Steel and High-Temperature Alloys 193
: Cobalt in 18-8 Steels 105
: „ „ High-Temperature Alloys 192
: „ „ 'Inconel' 105
: „ „ Major Amounts in Nickel-base Alloys 184

Page

Determination of—*contd.*
: Nickel in Ferrous and Ferromagnetic Materials 86
: Zirconium in Nickel-base High-Temperature Alloys 104
Ferrite Content: Determination in Austenitic Steels 265, 266
Mould for Simultaneous Sampling of Metals for Spectrographic and Chemical Analysis 12
Ring-Oven Technique: Analysis by 10
Sigma Phase: Identification in Stainless Steel 18
Solids Mass Spectroscopy 82
Spectroscopic Standard Samples for 16-25-6, 'Inconel X' and 'Waspaloy' 260
X-Ray Fluorescence Spectroscopy 82

Clad, Faced and Lined Materials, including **Sprayed Metals**

Coatings for Protection of High-Temperature Alloys during Heat-Treatment 259
Corrosion-Resistant Nickel Coatings: Application by Metallizing Techniques 144
Fuel-Element Cladding in Gas-Cooled Reactors: Suitability of Nickel-base Alloys for 196
Heat-Exchanger Tubing of Bimetallic Stainless-Steel/Copper Construction 47
Internal Cladding of Hollow Castings by the Centrifugal-Casting Technique 282
Metallizing of Machinery and Moulds Used in the Glass Industry 259
Molybdenum: Suitability of Nickel-Chromium-Cobalt Alloy for Cladding Against Catastrophic Oxidation 188
Kraft Digesters: Repair by Overlaying with Stainless Steel 197, 198, 310
Niobium
: Diffusional Effects in Cladding with Stainless Steel 195
: Nickel-containing Coatings for Protection from High-Temperature Oxidation 103
Weld Overlaying
: With 'Inconel' 45
: Of Kraft Digesters with Nickel-containing Materials 197, 198, 310
: With Nickel-containing Materials by the Gas-Shielded Process 51

Composition, Constitution and Structure

'17-7 P.H.': Hardening Mechanism 98
'17-22-AV' Steel: Influence of Hot Working on Structure 100
'A-286'
: Behaviour during Ageing 157
: Influence of Hot Working on Structure 100
: Structural Factors Contributing to Notch Sensitivity 257
Aluminium: Influence on Machinability of Stainless Steel 172
Aluminium Alloys: Influence of Nickel and Iron on Mechanical Properties 40
Aluminium-Nickel Alloys
: Factors Influencing Behaviour in High-Temperature Water and High-Pressure Steam 159, 160
: Influence of Second-Phase Particles on Corrosion in High-Temperature Water 195
: Metallography 159
: Oxide Films Formed on 133

Page

'AM-355' Steel: Avoidance of Retained Austenite in 190
Ammonia Atmospheres (Hot): Metallographic Examination of Nickel-containing Steels and Alloys after Exposure to 169
Ammonia Synthesis Equipment: Corrosion Mechanisms 132
'Astroloy': Compositional Aspects 44
Boron
: Influence of Trace Amounts on High-Temperature Properties of Austenitic Steels 162
: Influence on Properties of Austenitic Steels for Nuclear-Reactor Service 196
Brazing-Alloy Constituents: Diffusion into Heat-Resisting Materials 125
Brazing Alloys: Compositional and Structural Factors 268, 269
Calcium: Influence on Oxidation of Nickel-Chromium Resistance-Heating Alloys 229
Carbon: Influence on Precipitation-Hardening Characteristics of Iron-Chromium-Nickel-base Alloys 297
Carbon Pick-up: Effects on Stainless-Steel Castings Made in Resin-bonded Sands 106
Cerium: Influence on Oxidation of Nickel-Chromium Resistance-Heating Alloys 229
Chi Phase: Identification in Stainless Steels 18
Cold-Rolled 18-8-type Stainless Steels: Structural Factors Influencing Low-Temperature Properties 306
Copper: Influence on Corrosion Behaviour, Mechanical Properties and Age-Hardenability of Austenitic and Ferritic/Austenitic Steels 197
Copper- and Molybdenum-containing Cast Stainless Steels: Relationship between Composition, Processing Conditions, Precipitation and Properties 105
Copper-Nickel Alloys: Surface Tension and Contact Angles on Titanium Carbide 13
Corrosion: Fundamental Studies 131
Creep and Creep-Rupture Relationships in 18-8-Mo Austenitic Steel: Structural Factors 161
Crystal Structure: Influence on Corrosion 131
'DCM' Alloy: Microstructural Study 190
Dispersion Strengthening of Metals and Alloys: Compositional and Structural Factors 97, 191
Ferrite Content: Determination in Austenitic Steels 265, 266
Fuel-Oil-Ash Corrosion
: Influence of Ash Composition 260
: Of 25-20 Austenitic Steel: Metallographic Study 166
γ' Phase
: Influence of Alloying Additions on Precipitation in Nickel-base Alloys 158
: Influence of Particle Size on High-Temperature Properties of Nickel-base Alloys 158
: Influence on Elevated-Temperature Properties of Alloys in the Ni_3Cr-Ni_3Al System 157
Gases: Initial Reaction with Metals 131
Heat-Affected-Zone Cracking in 18-12-Nb Weldments: Microstructural Causes 42
Hydrogen: Influence on the Tensile Properties of Stainless Steel 49
Hydrogen Peroxide (Concentrated): Nature of Oxide Film Formed on 18-8-Ti Stainless Steel Immersed in 164
Iron-Lead-Nickel System 13
Iron-Lead-Nickel-Carbon System 13
Iron-Nickel-Carbon System 13
'IN-100': Compositional Aspects 190

Page
'INOR-8': Influence of Composition and Grain-Size on Properties in Air and in Fused Salts 299
Intergranular Corrosion
: Identification of Carbides Present in Stabilized Stainless-Steel Welds 79
: Influence of Composition on Susceptibility of Stainless Steels 106, 231
Intergranular Oxidation of Stainless Steels: Structural Studies 71
Intermetallic Compounds: Precipitation in Nickel-containing Alloys 124
Internal Carburization and Oxidation of Nickel-Chromium Alloys: Influence of Alloying Additions: Microstructural Study 41
Lead Oxide: Rôle in Catastrophic Oxidation of Exhaust-Valve Stainless Steels 138
Low-Temperature Properties of Ferrous Materials: Influence of Composition and Structure 54, 79, 234, 305, 306, 307
Magnesium: Influence on the Oxidation Kinetics of a Copper-Nickel Alloy 14
Magnetism: Occurrence in a High-Carbon Austenitic Hot-Rolled Stainless Steel 308
Martensite in Nickel-containing Steels: Morphology 130
Molybdenum- and Copper-containing Cast Stainless Steels: Relationship between Composition, Processing Conditions, Precipitation and Properties 105
Ni_3Cr-Ni_3Al System 157
Nickel
: Beneficial Effect on Resistance to Stress-Corrosion Cracking of Iron-Nickel-Chromium Alloys 134
: Influence on Atmospheric Corrosion of Steels 135
: Influence on Casting Quality and Fluidity of Stainless Steels 193
: Influence on the Chromium and Carbon Relationship in Refining Stainless Steel 161
: Influence on Precipitation-Hardening Characteristics of Iron-Chromium-Niobium-base Alloys 297
Nickel-Aluminium Alloys: Oxide Films Formed on 192
Nickel/Aluminium-Oxide and Nickel-Aluminide/Aluminium-Oxide Sintered Materials: Influence of Composition on Properties 191
Nickel-Chromium-Titanium-Aluminium Age-Hardenable Alloys: Influence of Heat-Treatment on Nature and Morphology of Phases Present 189
Nickel-Cobalt Alloys: Study of Oxide Films 41
Nickel-Molybdenum-Iron Alloys (Cast)
: Influence of Composition on Corrosion-Resistance in Acid Media 76
: Influence of Heat-Treatment on Structure 76
'Nimocast 90': Influence of Composition, Deoxidation Procedure and Grain-Size on Properties 226
'Nimonic' Alloys
: Structure of Flash-Butt Welds 200
: Welding Metallurgy 200
'Nimonic 80A': Influence of Structure on Temperature Coefficient of Resistance 229
Niobium
: Diffusion with Nickel and Stainless Steel 195
: Influence on Precipitation-Hardening Characteristics of Iron-Chromium-Nickel-base Alloys 297
: Influence on Properties of Cast Heat-Resisting Stainless Steels 162
Nitrogen: Solubility in Liquid Nickel-Chromium and Iron-Chromium-Nickel Alloys 83
Non-Magnetic Steels: Influence of Composition on Mechanical Properties 152
Oxide Films Formed on
: 18-8-Ti Steel in Hydrogen Peroxide 164
: Bright-Annealed '17-7 P.H.' and 'P.H. 15-7 Mo' 40
: Nickel-Aluminium Alloys 133, 192
: Nickel-Cobalt Alloys 41
: Silicon-containing Heat-Resisting Materials 256
Passivity in Stainless Steels
: Influence of Alloying Additions 49, 137
: Relationship with Electron Configuration 49
Power-Plant Piping: Influence of Long-Time Exposure at 1450°F. on Structure of Austenitic Steels 302
Precipitation-Hardenable Austenitic Stainless Steels: Influence of Alloying Additions 299
'RA-333': Compositional Aspects 128
Recrystallization after Cold Working: Structural Study of a Nickel-base Alloy 157
Sigma Phase
: Identification in Stainless Steel 18
: Influence on Properties of Austenitic Steels 302
Silicon Additions: Influence on Oxide Films Formed on Nickel-containing Heat-Resisting Materials 256
Stress Corrosion of Stainless Steels: Influence of Composition and Structure 72, 106, 133, 134, 308
Sulphur-containing Atmospheres at High Temperatures: Influence of Nickel and Chromium on Corrosion of Nickel-Chromium Alloys 136
Ti_2S: Occurrence in Titanium-Stabilized Austenitic Steels 163
Titanium-Nickel System Between Ti_3Ni and TiNi 249
Tungsten: Influence on Properties of Cast Heat-Resisting Stainless Steels 162
Vanadium: Influence on Nickel-base Alloys 70
'Waspaloy': Study of Carbides Present in 125
'Zerolled' Type 347 Stainless Steel: Influence of Compositional Modifications on Properties 304

General

First International Congress on Metallic Corrosion 130-37
High-Nickel Alloys: Literature Review 96
Selection of Materials for Marine Applications 170
Stainless Steels: Literature Review 97
Stainless-Steel Production in 1960 130

Plating

Direct Nickel Plating of Hardenable Stainless Steel 31
'Hastelloy C': Pre-Plating Treatment 62
Plating of Nickel-containing Materials by Deposition of Nickel from Liquid-Metal Solutions 246
Stainless Steel: Calorimetric Determination of the Thickness of Nickel Deposits on 91
'Stellite': Pre-Plating Treatment 62

Powder Production: Properties and Uses of Powder-Produced Alloys

Aluminium-Nickel Sintered Alloys 40, 107
Dispersion-Hardening and Properties of Dispersion-Hardened Materials 13, 97, 191, 256, 297
Nickel/Aluminium-Oxide Sintered Materials; Nickel-Aluminide/Aluminium-Oxide Sintered Materials 191
'ThermoSpray' Powders for Metallizing Machinery Used in the Glass Industry 259

Page

Production and Processing

'17-4 P.H.': Influence of Ageing Temperature on Susceptibility to Stress-Corrosion Cracking 262
'17-7 P.H.': Bright Annealing 40
'A-286': Influence of Heat-Treatment 157, 257
Aluminium-Nickel Alloys: Metallographic Preparation 159
'AM-355' Steel: Heat-Treatment of Forgings and Bar Stock 190
'Astroloy'
: Forging 129
: Heat-Treatment and Fabrication 44
Boron-containing Stainless Steels: Hot Workability 196
Bright Annealing 40, 139
Carbon Pick-up by Stainless-Steel Castings made in Resin-bonded Sands 106
Centrifugal-Casting Technique for the Production of Hollow Castings 282
Chemical Milling 55
Cold Heading of Nickel-containing Materials 19
Cold Working: Influence on Properties of Stainless Steel 79, 199, 228, 233, 303-307
Continuous Casting of Stainless Steel 130
Die Materials for High-Temperature Use 102
Dispersion Hardening 13, 97, 225, 256, 297
Drawing Stainless Steels and Nickel-Chromium Alloys: Oxalate-Coating Lubricant 171
Electrodeposition of Alloys Approximating to the Composition of 18-8 Stainless Steel 32
Electrolytic Polishing of Nickel-base Heat-Resisting Alloys 158
'Esshete 1250': Heat-Treatment and Workability 301
Explosive Forming of Nickel-containing Materials 258
Forging
: Aeronautical Applications of Forgings in High-Temperature Alloys 258
: Development of Hot-Die Materials 102
: Influence of Forging Temperature on Performance of 'Inconel 700' Rotor Blades 101
: Of 'Astroloy' 129
: Of Turbine Blades in 'Nimonic' Alloys 102
Heat-Treatment 40, 43, 44, 45, 47, 51, 76, 98, 100, 101, 105, 124, 125, 129, 139, 158, 189, 190, 191, 197, 226, 229, 257, 259, 262, 265, 267, 297, 299, 301
Hot Forming of 'Inconel' Welded Pipe 267
Hot-Rolling: Occurrence of Magnetism in a High-Carbon Austenitic Stainless Steel 308
Hot-Working: Influence on the Structure and Creep-Rupture Properties of Heat-Resisting Materials 100
Hot-Working Temperatures: Tensile/Impact Test for Determination of 43
'Inconel'
: Hot Forming of Welded Pipe 267
: Stress-Relief Treatment of Welds 45
'Inconel 700' Rotor Blades: Influence of Heat-Treatment and Forging Temperature 101
'Inconel X'
: Influence of Heat-Treatment on High-Temperature Properties of Sheet 98
: Post-Weld Heat-Treatment in the Fabrication of Pressure Vessels 47
Investment Casting of Nickel-base Alloys under Vacuum Conditions 97
'K Monel': Fabrication and Heat-Treatment of Arresting Hooks for Carrier-based Aircraft 51

Page

Machining
: 18-8 Stainless Steel with Carbide Tools 199
: Aluminium-containing Free-Machining Stainless Steel 172
: Cold-Worked Stainless Steel 233
: 'Nimonic 80A' 200
: Precipitation-Hardenable Steels and Nickel-base Alloys 172
Mar-Ageing 18 per cent. Nickel-Cobalt-Molybdenum Steel: Workability 115
Mar-Ageing Treatment 115-16
Melting and Heat-Treatment of Cast Austenitic Stainless Steels 105
Melting Procedures for Nickel-base Alloys 239
Metallizing of Machinery and Moulds Used in the Glass Industry 259
Metal Working: Recent Developments 43
'Monel': Electrodeposition of 90
Nickel/Aluminium-Oxide and Nickel-Aluminide/Aluminium-Oxide Sintered Materials: Production 191
Nickel-base Alloys: Literature Review 97
Nickel-Chromium-base Alloys: Melting Procedures 239
Nickel-Copper Alloys: Melting Procedures 239
Nickel-Molybdenum-Iron Alloys (Cast): Influence of Heat-Treatment 76
'Nimocast 90': Influence of Melting and Casting Procedures 226
'Nimonic 80A': Influence of Heat-Treatment on Temperature Coefficient of Resistance 229
Nitriding Steel (Nickel-Aluminium Age-Hardening): Heat-Treatment 122
Non-Magnetic Steels: Processing 152
Passivation Treatments: Effectiveness 262
'P.H. 15-7 Mo': Heat-Treatment Procedures 267
Pickling and Descaling of Heat-Resisting Steels and Alloys 303
Precipitation-Hardenable Austenitic Stainless Steels: Influence of Heat-Treatment 299
Recrystallization Treatment of a Cold-Worked Nickel-base Alloy 157
Refining Stainless Steel: Influence of Nickel on the Chromium and Carbon Relationship in 161
'René 41': Heat-Treatment 44, 45
Stainless Steel: Electrodeposition of Alloys Approximating to Composition of 32
Stainless-Steel Production in 1960 130
Stainless Steels: Literature Review 97
Stress-Relief Temperatures: Determination 43
Vacuum Melting 44, 97, 106, 155, 158, 162, 190, 201, 225, 299
'Waspaloy': Influence of Heat-Treatment 125
Wire for Special Applications: Production from Nickel-base Alloys 19
'Zerolling' Stainless Steels 304

Properties

A. Corrosion- and Oxidation-Resistance

'17-4 P.H.': Influence of Ageing Temperature on Susceptibility to Stress Corrosion 262
'17-7 P.H.': Inhibition of Corrosion by Fuming Nitric Acid 50
Acetic Acid: Corrosion of Nickel-containing Materials under Heat-Transfer Conditions 165
Aluminium-Nickel Alloys: Corrosion Behaviour in High-Temperature Water and High-Pressure Steam 40, 107, 133, 159, 160, 195
'AM-350': Susceptibility to Stress Corrosion in the Notched Condition 263

Page

'AM-355': Stress-Corrosion Resistance 190
Ammonia-Absorption System of a Nickel Refinery: Corrosion Problems 309
Ammonia Atmospheres (Hot): Behaviour of Nickel-containing Steels and Alloys in 169
Ammonia-Synthesis Equipment: Corrosion Mechanisms 132
Anodic Protection 131
Aqueous Corrosion in the Atomic Energy Industry 133
Atmospheric Corrosion 135, 232, 233
Bimetallic Stainless-Steel/Copper Heat-Exchanger Tubing: Corrosion-Resistance 47
Bismuth (Liquid): Intercrystalline Penetration of a Nickel Alloy by 261
Boiling-Water Reactor Systems (*See also* 'Aluminium-Nickel Alloys' and 'Inconel'): Corrosion of Low-Alloy and Stainless Steels in 188
Boron-containing Chromium-Nickel Stainless Steels: Corrosion Behaviour 196
Brazing Alloys: Oxidation-Resistance 268
Bromine: Influence of Moisture on the Resistance of Materials to 77
Calcium-Carbonate Paste: Suitability of 90-10 Cupro-Nickel for Handling 121
Canadian Atmospheres: Corrosion of Nickel-containing Steels in 233
Carbon Monoxide: Internal Oxidation of Nickel-Chromium Alloys in 41
Carbon Pick-up: Effects on Stainless-Steel Castings made in Resin-bonded Sands 106
Carburization (Internal) of Nickel-Chromium Alloys 42
'Carpenter 7 Mo': Susceptibility to Stress Corrosion 76
Cathodic Protection 71
Cavitation Erosion of Nickel-containing Materials 309
'CD-4MCu' Stainless Steel: Suitability for Torpedo-Tube Breech Doors 51
Chemical Process Industries: Unusual Corrosion Problems 131
Chlorohydrocarbons: Influence of Moisture on Resistance of Steels and Alloys to 77
Coal-Fired Boilers: Fireside Corrosion of Superheater Tubing 16, 17, 167
Condenser-Tube Alloys: Hot-Spot Corrosion 132
Condenser Tubes in Stainless Steel: Service Performance 168
Continuously Cast Stainless Steel: Properties 130
Copper-containing Chromium-Nickel Austenitic and Ferritic/Austenitic Steels: Corrosion Behaviour 197
Corrosion-Erosion of Sensitized Stainless Steels in ThO_2/UO_3 Slurry 78
Corrosion-Resistant Nickel Coatings Applied by Metallizing Techniques: Properties 144
Crystal Structure: Influence on Corrosion 131
Cupro-Nickels
: Corrosion Behaviour in Sea Water 108, 310
: Corrosion of Condenser Tubing under Conditions of Local High Temperature 132
: Corrosion of Feed-Water Tubes in C.E.G.B. Stations 132
: Corrosion-Resistance of Sheathing on Power-Line Poles in Marine Service 171
: Resistance to Calcium-Carbonate Paste 121
Diesel Cylinder Liners: Pitting Corrosion 151
Dies (Hot): Oxidation-Resistance 102
Ethanolamine Gas-Scrubbing Systems: Materials of Construction for 78
Exhaust-Valve Stainless Steels: Catastrophic Oxidation in the Presence of Lead Oxide 138
Feed-Water Tubes in C.E.G.B. Stations: Corrosion of 132

Page

Finnish Experience in Investigation of Corrosion Failures 132
First International Congress on Metallic Corrosion 130-7
Flade Potential of Nickel 240
Fluorine (Liquid): Resistance of Nickel-containing Materials to 48, 79
Formic Acid: Corrosion of Nickel-containing Materials under Heat-Transfer Conditions 165
Fuel-Oil-Ash Corrosion: *see* 'Oil-Ash Corrosion'
Fuming Nitric Acid: Inhibition of Corrosion by 50
Furnace Atmospheres: Control of Corrosion in 71
Furnace-Flue Gas: Corrosion of Stainless Steel and High-Nickel Alloys in 15
Fused Salts
: Corrosion in 18, 230
: Fused Chlorides: Thermodynamics of Corrosion in 71, 131
: Properties of 'INOR-8' in 299
Galvanic Corrosion 131, 232, 234
Gases: Initial Reaction with Metal 131
Gas-Turbine Blading Alloys: Corrosion-Resistance 225
'Hastelloy B': Resistance to Corrosion by Rubidium at High Temperatures 260
'Hastelloy N': *See* 'INOR-8'
Heat Exchangers: Impingement Attack 132
Heat-Exchanger Tubing in Bimetallic Stainless Steel/Copper: Corrosion-Resistance 47
Heat-Transfer Conditions: Corrosion Behaviour under 198
High-Temperature Water, Resistance to: *See* 'Aluminium-Nickel Alloys', 'Boiling-Water Reactor Systems', 'Inconel' and 'Stress Corrosion'
Hot-Spot Corrosion of Condenser-Tube Alloys 132
Hydrofluoric Acid: Resistance to Corrosion by 133
Hydrogen: Resistance to Attack by 132
Hydrogen-Fluoride Alkylation Units: Corrosion Experience 169
Hydrogen Peroxide (Concentrated): Compatibility of 18-8-Ti Stainless Steel with 164
Hydrogen Pick-up during Aqueous Corrosion of Nickel-containing Zirconium Alloys 139
Hydrogen Sulphide (Hot): Corrosion of Stainless Steels in 197
Impingement Attack on Non-Ferrous Tubing 132
'IN-100': Oxidation-Resistance 190
'Incoloy 804': Resistance to Carburization and Oxidation 188
'Inconel'
: Properties of Arc Welds Produced to Nuclear-Energy Requirements 139
: Resistance of 'Inconel'/Type 410 Stainless Steel Weldments to Stress Corrosion and Galvanic Corrosion in High-Temperature Water 234
: Resistance to Chlorohydrocarbons 77
: Selective Corrosion in Fused Salts 18
'Inconel 700': Corrosion in Sulphate/Chloride Mixtures 136
'Inconel 713C'
: Creep-Rupture Properties in Helium and in Air 299
: Suitability for Hot Dies 102
'Inconel X': Corrosion in Sulphate/Chloride Mixtures 136
Inhibition of Corrosion 50, 130
'INOR-8': Mechanical Properties in Air and in Molten Salts 299
Intergranular Corrosion
: Influence of Alloying and Residual Elements on the Resistance of Austenitic Steels 106

Page

Intergranular Corrosion—*contd.*
: Influence of Carbon Pick-up on Resistance of Stainless-Steel Castings made in Resin-bonded Sands 106
: In the Chemical and Petrochemical Industries 42, 131
: Of Stabilized Stainless-Steel Welds 79
: Resistance of Sensitized Stainless Steels in a ThO_2/UO_3 Slurry 78
: Statistical Study of Susceptibility of 18-8-type Steels 231
Intergranular Oxidation of Stainless Steels by Oxygen and Dry Sodium Chloride 71
Internal Carburization and Oxidation of Nickel-Chromium Alloys in Carbon-Monoxide Atmospheres 41
Iron-Nickel Alloys: Anodic-Polarization Behaviour in Sulphuric-Acid Solutions 194
'K Monel': Suitability for Arresting Hooks of Carrier-based Aircraft 51
Knifeline Attack on Stabilized Steel Welds 79
Kraft Digesters: Corrosion Experience 197, 198, 310
Lead-Cadmium-Nickel Alloys: Corrosion-Resistance 183
Lead Oxide: Rôle in Catastrophic Oxidation of Exhaust-Valve Stainless Steels 138
Mar-Ageing 18 per cent. Nickel-Cobalt-Molybdenum Steel 115-16
Marine Service: Economic Considerations in the Selection of Materials 170
Molybdenum: Protection from High-Temperature Oxidation by Nickel/Chromium Plating 90
'Monel'
: Corrosion Behaviour in Sea Water 108
: Resistance to Bromine 77
: Resistance to Chlorohydrocarbons 77
: Suitability for Handling Hydrofluoric Acid 133
: Suitability of 'K Monel' for Arresting Hooks of Carrier-based Aircraft 51
'Nichrome V': Suitability as a Protective Coating for Niobium 103
Nickel-Aluminium Alloys: Oxidation Behaviour 192
Nickel-base Alloys: Reviews 96, 230, 297
Nickel-Cobalt Alloys: Oxidation Behaviour 41
Nickel-Molybdenum-Iron Alloys (Cast): Corrosion-Resistance in Acid Media 76
'Nimonic' Alloys: Corrosion Behaviour in Sulphate/Chloride Mixtures 136
Niobium: Protection from High-Temperature Oxidation by Nickel-containing Coatings 103
'Ni-O-Nel': Resistance to Chlorohydrocarbons 77
Nitric Acid
: 65Ni-35Cr Alloy with Improved Resistance to 133, 188
: Influence of Chloride Content on Corrosion-Resistance of Nickel-containing Materials 137
: Resistance of Nickel-containing Steels and Alloys to 133, 165
Nitrogen: Resistance to Attack by 132
Nitrogen Environments (High-Temperature): Corrosion-Resistance of Nickel-base Alloys in 196
Nitrogen Tetroxide: Resistance of Stainless Steels to 308
Nuclear-Power-Plant Tubing Materials: Resistance to Corrosion by Boiler Sludge 17
Oil-Ash Corrosion
: 60-40 Chromium-Nickel Alloy 15
: Alloys with Improved Resistance to 188
: Influence of Temperature and Fuel Composition 14
: Inhibitors 14, 15, 260

Page

Oil-Ash Corrosion—*contd.*
: Minimum Temperature Limits 260
: Resistance of 25-20 Austenitic Steel to Synthetic Ash 166
: Tests on Materials Exposed to Flue Gases 15
Oil-Well Tubing: Stress Corrosion 18
Oxidation
: Influence of Magnesium on Oxidation Kinetics of Copper-Nickel Alloys 14
: Intergranular Oxidation of Stainless Steels in Oxygen and Dry Sodium Chloride 71
: Internal Oxidation of Nickel-Chromium Alloys 41
: Of High-Purity Nickel 283
: Of Nickel-Cobalt Alloys 41
: Oxidation-Resistance of Brazing Alloys 268
: Oxidation-Resistance of 'IN-100' 190
: Oxidation-Resistance of Vacuum-Melted Stainless Steel Containing Minor Alloying Additions 162
: Reactions in Nickel-Chromium Resistance-Heating Alloys 229
Oxide Films Formed on
: 18-8-Ti Steel in Hydrogen Peroxide 164
: Bright-Annealed '17-7 P.H.' and 'P.H. 15-7 Mo' 40
: Nickel-Aluminium Alloys 133, 192
: Nickel-Cobalt Alloys 41
: Silicon-containing Heat-Resisting Materials 256
Oxygen
: Resistance of Nickel-containing Materials to Liquid Oxygen 79
: Adsorption on Nickel and on an Iron-Nickel-Chromium Alloy 255
Passivation Behaviour of Nickel-containing Alloys and Steels 49, 71, 131, 134, 137, 164, 194, 240, 261, 262
'P.H. 15-7 Mo': Resistance to Nitrogen Tetroxide 308
Phosphoric Acid
: 42Ni-21Cr-3Mo-Fe Alloy with Improved Resistance to 188
: Corrosion of Nickel-containing Materials under Heat-Transfer Conditions 165
Potassium Carbonate Saturated with Carbon Dioxide and Hydrogen Sulphide: Resistance of Nickel-containing Materials to 231
Pitting Corrosion
: Electrochemical Studies (*See also* 'Passivation Behaviour', above) 131
: In the Chemical Process Industries 131
: Kinetics 164
: Magnetic Method of Detecting Corrosion Currents 91
: Of Condenser Tubing in Oil Refineries 132
: Of Diesel Cylinder Liners 151
: Of Stainless Steels in Chloride Solutions 261, 262
: Resistance of Bimetallic Heat-Exchanger Tubing 47
Pulp-Mill Equipment: Corrosion Experience 50, 197, 198, 310
'RA-333': Suitability for Critical Parts in Heat-Treating Furnaces 128
Review of Recent Developments in High-Nickel Corrosion-Resisting Alloys 230
Sea Water
: Corrosion Behaviour of Nickel-containing Materials in 170
: Premature Failure of Copper-Nickel Alloys in 310
: Resistance of Stainless-Steel and Nickel-base-alloy Condenser Tubes to 108

Page

'S.G. Ni-Resist': Properties 63
Sludge in Nuclear-Power-Plant Steam Generators 17
Slurries: Corrosion-Erosion of Sensitized Stainless Steel in a ThO_2/UO_3 Slurry 78
Slurries, Acid: Symposium on Handling of 263-5
Springs in Nickel-containing Corrosion-Resisting Alloys 128
Stainless Steels: Literature Review 97
Stress Corrosion (Unless otherwise stated, the references relate to stainless steels)
: A.S.T.M. Report on Stress-Corrosion Cracking of Austenitic Chromium-Nickel Stainless Steels 72-74
: Bibliographies 72, 74
: Comparative Behaviour of Various Grades of Stainless Steel 74, 134, 308
: Feasibility of Preventing Failure by Establishing Threshold Values 75
: Influence of Ageing Temperature on Susceptibility of '17-4 P.H.' 262
: Influence of Anodic and Cathodic Polarization 134
: Influence of Composition, Structure and Alloying and Residual Elements on the Resistance of Austenitic Steels 106, 133, 134
: Influence of Nickel Content on Susceptibility of Iron-Nickel-Chromium Alloys 134
: Influence of Surface Coatings on Susceptibility 75
: In Hydroxide Media 74, 75
: In Nitrogen Tetroxide 308
: In the Petroleum and Petrochemical Industries 42, 131
: Of A.I.S.I. 4340 and 9% Nickel Steel Oil-Well Tubing 18
: Of 'AM-350' in the Notched Condition 263
: Of 'AM-355' 190
: Of De-aerator Trays 76
: Of Single Crystals 133
: Resistance of Bimetallic Stainless-Steel/Copper Heat-Exchanger Tubing 47
: Resistance of Copper-base Alloys 199
: Resistance of 'Inconel'/Type 410 Weldments 234
: Resistance of Mar-Ageing 18 per cent. Nickel-Cobalt-Molybdenum Steel 115
: Test for Copper-base Alloys 199
Sulphate/Chloride Mixtures: Corrosion of High-Temperature Nickel-base Turbine-Blading Alloys 136
Sulphur-containing Atmospheres at High Temperatures: Corrosion of 80-20 Nickel-Chromium Alloys in 136
Sulphur-Dioxide, Hot: Resistance of Stainless Steel to 50
Sulphuric Acid: 42Ni-21Cr-3Mo-Fe Alloy with Improved Resistance to 188
Sulphuric Acid Containing Various Kinds of Oxidizing Agents: Electrochemical Study of Austenitic Steel in 131
'Thermo-Kanthal': Thermocouple Alloy with Improved Resistance to Oxidation 103
'ThermoSpray' Powders: Suitability for Metallizing Machinery and Moulds Used in the Glass Industry 259
Titanium-Stabilized Austenitic Steels: Occurrence of Ti_2S 163
Tropical Environments: Corrosion of Stainless Steel 232
Water, High-Temperature: *See* 'High-Temperature Water'
Wire in Nickel-base Corrosion-Resistant Alloys 19

B. Mechanical and Physical Properties

'17-22AV' Steel: Influence of Hot Working on Creep-Rupture Properties 100
'17-7 P.H.'
: Fatigue Properties 70
: Low-Temperature Properties 305
: Mechanism of Hardening 98
: Short-Time Properties at Elevated Temperatures 40
: Tensile Properties under Rapid-Heating Conditions 257
25% Nickel Age-Hardenable Steels for High-Strength Applications 37
'A-286'
: High-Temperature Properties of Plate and Bar 99
: Influence of Hot Working on Creep-Rupture Properties 100
: Metallurgical Characteristics 157
: Notch Sensitivity 257
Aluminium-Nickel-Iron Alloys: Mechanical Properties 40
'AM-350'
: Fatigue Properties 70
: High-Temperature Properties of Plate and Bar 99
: Low-Temperature Properties 305
'AM-355'
: Fatigue Properties 70
: Properties of Forgings and Bar Stock 190
'Astroloy'
: Development and Properties 44
: Properties of Forgings 129
Austenitic S.G. Iron Castings 150
Austenitic Stainless Steels and Alloys: Relationship between Composition, Melting and Processing Treatments, Structure and Properties 105
Boron-containing Austenitic Steels: Creep Properties 162
Boron-containing Stainless Steels for Nuclear-Reactor Service: Mechanical Properties 196
Boron-Vanadium-Tungsten-containing Cast Heat-Resisting Steels 162
Brazing-Alloy Constituents: Diffusion into Heat-Resisting Materials 125
Casting Quality
: Of Stainless Steels 193
: Of 'Ni-Resist' 193
Cavitation Erosion of Nickel-containing Materials 309
'CD-4MCu' Stainless Steel: Suitability for Torpedo-Tube Breech Doors 51
Cold-Headed Nickel-containing Materials 19
Condensing Heat-Transfer Rates of Nickel-containing Condenser-Tube Materials 256
Conductivity: Thermal and Electrical Conductivity of 'Nimonic' Alloys 39
Continuously Cast Stainless Steel: Properties 130
Copper-containing Chromium-Nickel Austenitic and Ferritic/Austenitic Steels: Mechanical Properties 197
Copper-Nickel-Iron Alloy for Feedwater-Heater Tubing: Physical and Mechanical Properties 193
Creep and Creep-Rupture Properties
: 'A-286' 157
: 'AM-355' 190
: 'Astroloy' 44
: Comparison of Air-Melted and Vacuum-Melted Materials 155
: Copper-containing Stainless Steels 197
: Creep and Creep-Rupture Relationships in 18-12-Mo Steel 161
: Dispersion-Hardened Materials 13, 256

Page

Creep and Creep-Rupture Properties—*contd.*
: Forgings in Nickel-base Alloys 258
: Gas-Turbine Blading Alloys 225
: 'IN-100' 190, 297
: Influence of γ' Particle Size 158
: „ „ Hot Working 100
: „ „ Minor Alloying Additions in 18-12-Mo Steel 162
: „ „ Section Size in Nickel Specimens 159
: „ „ Trace Amounts of Boron in Austenitic Steels 162
: 'Inconel 700' Rotor Blades 101
: 'Inconel 713C' in Helium and in Air 299
: 'Inconel X' 98
: 'INOR-8' 299
: Nickel-containing Alloys Contaminated by Fused Salts 230
: Nickel Silver 220
: 'Nimocast 90' 226
: 'RA-333' 128
: Specifications 69
: Type 304 Stainless Steel 193
: Under Rapid-Heating Conditions 156
Design Data on Nickel-base Alloys for Aircraft and Missiles 155
Dies, Hot: Suitability of Nickel-containing Materials for 102
Dispersion-Strengthened Materials 13, 97, 256
Dynamic Moduli of Elasticity of Nickel-containing Materials at Elevated Temperatures 227
Electrical Precision Resistances: Suitability of 'Nimonic 80A' 229
'Esshete 1250' Austenitic Creep-Resisting Steel: Properties 301
Fatigue Properties of Precipitation-Hardenable Stainless Steels 70
Feedwater-Heater Tubing: Copper-Nickel-Iron Alloy for 193
Fluidity of Stainless Steels and of 'Ni-Resist' 193
Forgings in High-Temperature Alloys for Aeronautical Applications 258
Fused Salts: Properties of Nickel-containing High-Temperature Alloys Contaminated by 230
'G-39': Thermal-Fatigue Resistance 126
'G-42B': Thermal-Fatigue Resistance 126
γ' Particle Size: Influence on High-Temperature Properties of Nickel-base Alloys 158
Gas-Turbine Blading Alloys: Recent Developments 225
Gunmetals: Influence of Nickel on High-Temperature Properties 293
'Hastelloy N': *See* 'INOR-8'
Hot-Working Temperatures: Relationship with Tensile/Impact Properties 43
Hydrogen: Influence on Tensile Properties of Stainless Steels 49
Impact-Resistance of Austenitic Steels after Long-Time Exposure to High Temperatures 302
'IN-100': Properties 190, 297
'Inconel'
: Low-Temperature Properties 47
: Properties of 'Inconel'/Type 410 Weldments 234
: Properties of Welded Pipe 267
: Properties of Welds Produced for Nuclear-Power Applications 45, 139, 200
'Inconel 700' Rotor Blades: Influence of Forging Temperature and Heat-Treatment on Performance 101
'Inconel 713C'
: Creep-Rupture Properties in Helium and in Air 299
: Suitability for Hot Dies 102

Page

'Inconel X'
: High-Temperature Properties of Plate and Bar 99
: Influence of Heat-Treatment on High-Temperature Properties of Sheet 98
'INOR-8': High-Temperature Properties in Air and in Fused Salts 299
Intergranular Precipitation of Intermetallic Compounds in Nickel-containing Austenitic Alloys 124
Intermediate Temperature Ductility Minimum in 'Monel' and Cupro-Nickel 248
Intermetallic Compounds: High-Temperature Properties 4-7
Investment Castings in High-Alloy Steels and Nickel- and Cobalt-base Alloys 124
Iron-Chromium-base Alloys: Influence of Nickel, Carbon and Niobium on High-Temperature Strength 397
'K Monel': Suitability for Arresting Hooks of Carrier-based Aircraft 51
Low-Temperature Properties of Nickel-containing Alloys and Steels 47, 48, 54, 79, 95, 96, 188, 199, 234, 303-7
Machinability
: 18-8 Stainless Steel 172, 199
: 'Nimonic 80A' 200
Magnetic Properties of Austenitic S.G. Iron 251
Magnetism in Hot-Rolled Austenitic Stainless Steel 308
Mar-Ageing 18 per cent. Nickel-Cobalt-Molybdenum Steel: Properties 115-116
'Monel': Low-Temperature Properties 47
'N-155': Short-Time Elevated-Temperature Stress/Strain Behaviour 40
Nickel/Aluminium-Oxide and Nickel-Aluminide/Aluminium-Oxide Sintered Materials: Properties 191
Nickel-base Alloys: Reviews 96, 225, 297
Nickel-Chromium-Aluminium Alloys: Elevated-Temperature Properties 157
Nickel-Molybdenum-Iron Alloys, Cast: Influence of Heat-Treatment on Hardness 76
Nickel Silver: Creep and Rupture Properties 220
Nickel-Tin Stable and Unstable Solid-Solution Alloys: Creep and Fracture 294
'Nimocast 90': Tensile Ductility and Stress-Rupture Properties 226
'Nimonic' Alloys
: Evolution of Nickel-base Precipitation-Hardening Alloys 297
: Properties of Flash-Butt Welds 200
: Thermal and Electrical Conductivity 39
: 'Nimonic 80A': Machinability with Carbide Tools 200
: Temperature Coefficient of Resistance 229
: 'Nimonic 90' : Thermal-Fatigue Resistance 126
: 'Nimonic 100' : „ „ „ 126
Niobium: Diffusion with Stainless Steel 195
Niobium-containing Stainless-Steel Weldments: Heat-Affected-Zone Cracking 42
Niobium-Vanadium-Boron-containing Cast Heat-Resisting Steels: High-Temperature Properties; Influence of Vacuum-Melting 162
'Ni-Resist': Fluidity and Casting Quality 193
Nitriding Steel (Nickel-Aluminium Age-Hardening): Mechanical Properties 122
Nitrogen Environments (High-Temperature): Mechanical Properties of Nickel-base Alloys Exposed to 196
Non-Magnetic Steels: Mechanical Properties 152
'P.H. 15-7 Mo'
: Effect of Annealing in Hydrogen 40

Page

'P.H. 15-7 Mo'—*contd.*
: High-Temperature Properties of Plate and Bar 99
: Properties of Welded Sheet 267
Physical Properties of Nickel-base Alloys 154
Power-Plant Piping: Influence of Long-Time Exposure at 1450°F. on Impact-Resistance of Austenitic Steels 302
Precipitation-Hardening Stainless Steels 70, 98, 99, 100, 128, 155, 156, 188, 227, 257, 265, 267, 297, 299, 301, 303, 305
'RA-333': Suitability for Critical Parts in Heat-Treating Furnaces 128
Rapid Heating and Rapid Loading at High Temperatures: Effect on Mechanical Properties 40, 156
Sandwich Structures in Precipitation-Hardenable Stainless Steels 128
Scoring Characteristics of Stainless Steel 70
Section Size
: Influence on Creep-Rupture Behaviour of Nickel Specimens 159
: Influence on High-Temperature Tensile Properties of Stainless Steels 163
'S.G. Ni-Resist': Properties and Applications 63
Spot-Welded Stainless Steels and Nickel-base Alloys: Properties 311
Spring Alloys (Nickel-containing for Special Applications): Properties 128
Stainless Steel: Literature Review 97
'Stellite X-40': Thermal-Fatigue Resistance 126
Stress Concentration: Influence on Tensile Strength of Steel Sheet at Various Temperatures 304
Stress-Relief Temperatures: Determination for Heat-Resisting Alloys 43
Stress-Rupture Properties: *See* 'Creep and Creep-Rupture Properties'
Stress-Rupture Testing: Suitability of 18-8 Steel for Calibration Specimens 193
Temperature: Influence on Tensile Properties of Stainless Steel 163
Temperature Coefficient of Resistance of 'Nimonic 80A' 229
Thermal-Fatigue Characteristics 126, 190, 225, 227
Thermocouple Materials: Influence of Pressure on e.m.f. 192
'ThermoSpray Powders': Metallizing of Machinery and Moulds Used in the Glass Industry 259
Tubular-Bladed Nickel-Alloy Welded Turbine Wheel: Properties 267
'Udimet 500': High-Temperature Properties of Plate and Bar 99
Ultrasonic Welding of Nickel-containing Materials to Refractory Metals: Properties of Weldments 312
Vacuum-Melted and -Cast Materials 44, 97, 106, 155, 158, 162, 190, 201, 225, 299
Vanadium-Boron-Tungsten-containing Heat-Resisting Steels: High-Temperature Properties; Influence of Vacuum Melting 162
Vanadium-containing Nickel-base Alloys: High-Temperature Properties 70
Wide-Gap Brazing of Components for High-Temperature Service: Mechanical Properties of Joints 269
Wire for Special Applications: Properties 19
'Zerolled' Stainless Steel: Properties 304

Specifications

Austenitic S.G. Iron Castings: *A.S.T.M. A*439-60*T* 150

Page

Copper and Copper-Alloy Integral-Finned Seamless Condenser and Heat-Exchanger Tubes: *A.S.T.M. B*359-60 148
Copper-Alloy Ingots and Copper and Copper-Alloy Castings: *B.S.*1400:1961 217
Copper-Nickel-Alloy Castings: A.S.T.M. Specification 220
Design Data on Nickel-base Alloys for Aircraft and Missiles 155
Determination of Proof Stress, Rupture Strength and Creep Strength of Steel at Elevated Temperatures: *B.S.* 3228: 1960 69
Investment Castings in High-Alloy Steels and Nickel- and Cobalt-base Alloys: *B.S.* 3146: *Part* 2: 1961 124
Nickel-Chromium-Cobalt Wrought Turbine-blading Alloy: *D.T.D.* 747*A* 225
Nickel-Chromium Heat-Resisting Alloy Sheet and Strip: *D.T.D.* 703*B* 224

Testing

Acceleration of Corrosion Tests on the Basis of Kinetic Studies of the Rate-Controlling Combination of Factors 135
'AM-355': Microetch Test for Control of Homogeneity 190
Atmospheric Corrosion: Electrochemical Techniques 135
'Belt' Super-Pressure Apparatus for Determining Influence of Pressure on e.m.f. of Thermocouple Materials 192
Boiler-Sludge in Nuclear-Power Plant: Heat-Exchanger Tests 17
Cavitation Erosion: Test Apparatus 309
Coal-Fired Boilers: Service and Laboratory Corrosion Tests 16, 17, 167
Drude-Tronstad Polarimeter: Use in Corrosion Studies 135
Dynamic Moduli of Elasticity: Determination at Elevated Temperatures 227
Ferrite Content: Determination in Austenitic Steels 265, 266
Fluidity and Casting Quality of Stainless Steels and 'Ni-Resist': Spiral Test for Evaluation of 193
Forging Tests: Development of Hot-Die Materials 102
Fracture Surfaces: Examination by Two-Stage Replica Technique 49
Heat-Transfer Conditions
: Laboratory Corrosion Tests Simulating Service Conditions 198
: Test Apparatus for Study of Corrosion by Acids 165
Hot-Spot-Corrosion Tests on Condenser-Tube Alloys 132
Hot-Working Temperatures: Tensile/Impact Test for Determination of 43
Intergranular Corrosion: Equation for Evaluation of Susceptibility of Stainless Steels to 231
Laboratory Corrosion Testing in Germany 135
Oil-Ash Corrosion: Laboratory and Service Tests 14, 15, 166, 260
Pitting Corrosion
: Magnetic Method of Determining Corrosion Currents 91
: Study by Means of Turnbull's Colour Reaction 262
Scoring Characteristics: Apparatus for Study of 70
Stress-Corrosion-Cracking Test for Copper-base Alloys 199
Stress-Relief Temperatures: Determination by the Hindered-Thermal-Contraction Technique 43

Page

Stress-Rupture Testing: Suitability of 18-8 Steel for Calibration Specimens 193
Sulphate/Chloride Mixtures: Tests Simulating Sulphur Attack in an Oxidizing Atmosphere 136
Sulphur-containing Atmospheres at High Temperatures: Apparatus for Study of Corrosion 136
Thermal-Fatigue Tests 126, 227

Uses

Uses grouped in this sub-section are individually referred to in the **Properties** and **Specifications** sub-sections, in relation to the properties which render the materials suitable for the respective applications.

Aircraft (including Structural Uses, also Rockets and Missiles) 37, 40, 48, 50, 51, 70, 79, 98, 99, 128, 155, 156, 157, 227, 228, 230, 233, 257, 258, 267, 303-307, 308, 311
Architecture 135, 232, 233
Bearing Materials 70
Brazing Alloys 104, 125, 201, 268, 269
Chemical, Petrochemical and Petroleum Industries 18, 42, 47, 71, 76, 77, 78, 96, 97, 121, 131, 132, 144, 164, 165, 169, 188, 193, 197, 230, 231, 263-5, 309
Die Materials 102
Exhaust Valves 138
Fasteners 19
Furnace Materials 14, 15, 16, 17, 71, 128, 136, 166, 188, 260
Gas Turbines 13, 31, 38, 39, 44, 45, 70, 97, 99, 101, 102, 124, 125, 126, 129, 136, 154, 155, 157, 158, 189, 190, 224, 225, 226, 227, 256, 257, 258, 260, 263, 266, 267, 297
Glass Industry 259
Low-Temperature Service 47, 48, 54, 79, 139, 188, 199, 234, 303-307
Marine Applications 51, 108, 170, 171, 309, 310
'Nimonic' Alloys: Applications other than Aeronautical 39, 229
Nitriding Steels 122, 295
Nuclear-Power Plant 17, 18, 40, 45, 78, 103, 107, 133, 137, 139, 159, 160, 188, 195, 196, 200, 234, 260, 262, 266, 267, 268, 299, 311
Pulp Plant 50, 197, 198, 264, 310
Springs 128
Steam Plant 14, 15, 16, 17, 42, 76, 132, 167, 168, 188, 193, 256, 260, 268, 301, 302
Thermocouples 103, 192
Wire 19

Welding, Brazing and Soldering

'A-286': Influence of Boron Content on Weldability 157
Boron-containing Chromium-Nickel Stainless Steels: Weldability 196
Brazing and High-Temperature Brazing Alloys
: Brazing Alloys for 'René 41' 45
: Brazing of High-Temperature Materials: Survey 104
: Brazing Sandwich Structures in Stainless Steel 128
: Development of Ductile Nickel-base Brazing Alloys 268
: Diffusion of Brazing-Alloy Constituents into Heat-Resisting Materials 125
: Vacuum Melting in Production of High-Temperature Brazing Alloys 201

Page

Brazing and High-Temperature Brazing Alloys—*contd.*
: Wetting Tests on 'Inconel' and 'Inconel X with Silver Brazing Alloys Containing Platinum Metals 270
: Wide-Gap Brazing Alloys for High-Temperature Service 269
Cast Austenitic Stainless Steels and Alloys: Influence of Grain-Boundary Phases on Weldability 105
Cold-Worked Stainless Steel
: Influence of Welding on Elevated-Temperature Short-Time Tensile Properties 228
: Weldability 233
Copper-containing Stainless Steels: Weldability 197
Copper-Nickel-Iron Alloy for Feedwater-Heater Tubing: Weldability 193
Corrosion-Resistance of Welded Materials
: Corrosion-Resistance of Cupro-Nickel Welded Fin Drums for Drying Calcium-Carbonate Paste 121
: 'Inconel' for Nuclear-Reactor Service 45, 139, 200, 234, 266
: Inhibition of Corrosion of Welded Specimens by Fuming Nitric Acid 50
: Intergranular Corrosion of Stabilized Stainless-Steel Welds 79
: Knifeline Attack on Stabilized Stainless-Steel Welds 79
: Kraft Digesters: Weld Overlaying with Nickel-containing Materials 197, 198, 310
: Welded Stainless Steels for Service with Hot Hydrogen Sulphide 197
Ferrite in Stainless-Steel Welds: Estimation of 266
Flash Welding of Nickel-base High-Temperature Alloys 266
Heat-Affected-Zone Cracking in 18-12-Nb Weldments 42
'Inconel'
: Fabrication and Properties of Welded Pipe 267
: 'Inconel' BP-85 Welding Electrode: *See* 'Inconel' Welding Electrode 182, below
: 'Inconel' BP-87 Filler Wire: *See* 'Inconel' Filler Metal 82, below
: 'Inconel' Filler Metal 82 45
: 'Inconel' Welding Electrode 182 45, 200, 234
: Ultrasonic Welding to Refractory Metals 312
: Welding for Nuclear-Reactor Service 45, 139, 200, 234, 266
: Wetting Tests 270
'Inconel X'
: Wetting Tests 270
: Welding in the Fabrication of Pressure Vessels 47
'K Monel': Fabrication of Arresting Hooks for Carrier-based Aircraft 51
Low-Temperature Service
: Influence of Welding on Low-Temperature Properties 54, 79
: Steel Sheet for Use in Welded Plant 95
: Welding a 60-ton Stainless-Steel Cryogenic Vessel 139
Mar-Ageing 18 per cent. Nickel-Cobalt-Molybdenum Steel: Weldability 115
Nickel-base Alloys: Literature Review 96
'Nimonic' Alloys
: Structure and Properties of Flash-Butt Welds 200
: Welding Metallurgy 200
'P.H. 15-7 Mo': Welding Procedures for Sheet 267
'René 41': Brazing and Welding 44, 45
Spot Welding of Stainless Steels and Nickel-base Alloys by the Semi-Automatic Gas Tungsten-Arc Process 311

Page
Stainless Steel: Welding to Chromium-Molybdenum Steel for High-Temperature Service 268
Stainless Steels: Literature Review 97
Tubular-Bladed Turbine Wheel: Fabrication by Welding 267
Ultrasonic Welding of Nickel-containing Materials to Refractory Metals 312
Welding of Materials for High-Temperature Service 104
Weld Overlaying with Nickel-containing Materials 45, 51, 197, 198, 310

PATENTS

20-24, 109-112, 202-209, 271-279

CORRIGENDA TO ITEMS IN VOLUME 34

Issue No. 3, p. 54.

Low-Temperature Mechanical Properties of Structural Materials: Compilation of Published Data, line 1.
For H. P. GIBSON,
Read H. P. GIBBONS.

Issue No. 5.

Atmospheric Corrosion of Steels as Influenced by Changes in Chemical Composition, p. 135, line 23.
For Nickel: residual; 0·1,
Read Nickel: residual; 1·0.

Electrodeposition of Nickel-Copper Alloys from the Pyrophosphate Solution, p. 118, line 3 of footnote.
For Nos. 2 and 3,
Read Nos. 2 and 4.

Corrosion of Nickel-Chromium Alloys in Sulphur-containing Atmospheres at High Temperatures, p. 136, line 7.
For 18-20-type alloy,
Read 80-20-type alloy.

Issue No. 6.

Ferritic S.G. Iron Castings for Valves, Flanges, etc., p. 149, line 4.
For *A.S.T.M. Designation*: *A*455-60*T*,
Read *A.S.T.M. Designation*: *A*445-60*T*.

Selection of Materials for Marine Applications: Economic Considerations, p. 170, right-hand column, paragraph (5).
For 70-30 Cu-Ni-Fe . . . 1865 (24 per cent. retubed (Commercial) in 15 years),
Read 70-30 Cu-Ni-Fe . . . 18·5 (24 per cent. retubed (Commercial) in 15 years).

Aluminium-containing Free-Machining Stainless Steel, p. 172, first column of table.
For Nitrogen,
Read Nickel.

Issue No. 7-8, p. 179.

Brightening and Levelling Characteristics of Organic Addition Agents and their Effects on Stress in Nickel Deposits, right-hand column, lines 9 and 10 of last paragraph.
For concentrations of 0·2-5 g./L., respectively,
Read concentrations of 0·2 and 5 g./L., respectively.

Issue No. 9, pp. 222-3.

Spheroidal-Graphite Iron Castings: British Standard, p. 223, line 1 of last paragraph.
For Grade SNG 27/2,
Read Grade SNG 27/12.

Issue No. 12, p. 291.

Advances in Nickel/Chromium Plating, line 4.
For aluminium-plating solutions,
Read chromium-plating solutions.

TRADE-NAMES, MATERIALS AND PROCESSES

[Referred to in Nickel Bulletin, Volume 34, 1961

12MoV
  See U.S.S.
16-25-6
  See Timken
17-4 P.H.
  See Armco
17-7 P.H.
  See Armco
17-22-AV
  See Timken
19-9 DL, 54, 256, 311.
155 Alloy, 160.
157 Alloy, 160, 195.
300M, 35, 36, 39, 54, 156, 254, 304.

A-255, 159.
A-286, 54, 100, 156, 157, 172, 227, 257, 258, 300, 304.
A-300, 159.
Acicular Cast Iron, 63.
Aereal 1, 159.
AF-183, 54.
Air Steel (X200), 156.
Alcomax Alloys
  Alcomax II, 221.
  Alcomax III, 221.
  Alcomax IV, 221.
Alnico Alloys
  Alnico, 185, 221.
  Alnico V, 185.
Alumel, 192.
AM-350, 54, 70, 157, 227, 263, 303, 304, 305.
AM-355, 70, 100, 156, 190, 303.
A Nickel
  See Nickel
A.R.D.E. Smoothing Process, 69.
Armco 17-4 P.H., 54, 303.
Armco 17-7 P.H., 40, 50, 54, 70, 98, 128, 157, 227, 257, 303, 305.
Armco P.H. 15-7 Mo, 40, 100, 128, 227, 258, 267, 303, 305, 308.
Astroloy, 44, 129, 258.

B.N.F. Thickness Tester, 9, 216.
BX Oxalate Coating, 171.

C-242, 156.
Carballoy, 62.
Carpenter 7Mo, 76.
Carpenter 20, 77, 134, 138, 197.
Carpenter 20Cb, 165, 264.
Carpenter V-57, 43.
CD-4MCu, 51.
Chromel, 192.
Chro-Mow, 157.
Columax, 221.
Constantan, 192.
Corrodkote Accelerated-Corrosion Test, 9, 29, 118, 135, 214, 244, 286, 287, 288, 289.
Cor-Ten
  See U.S.S.
Croloy 16-1, 18.
Crucible 56, 156.
Cunife, 94.

D6A, 39.
D-979, 54, 154, 258.
DCM, 154, 190, 225.
Dermitron, 288.
DeWeKa-Doniplat Plating Solution, 146.
DeWeKa-Superglanz Plating Solution, 146.
Discaloy, 228, 300.
Duranickel, 169.
Durimet 20, 132, 256.
Dynaflex, 156.

Efco-Udylite No. 31 Plating Solution, 31.
EPE 10
  See Nimocast PE10
EPK 24, 225
  (*See also* IN 100)
Esshete 1250, 301.
Everdur, 50.

FN220, 225.
F Nickel
  See Nickel
F.V. 520B, 54.

G-34, 156.
G-39, 127.
G-42B, 127.
G-64, 225.
G-67, 225.
G-70, 225.
G-74, 225.
GMR-235, 155, 156.
GMR-235D, 156.
Guy Alloy, 156.

Hastelloy Alloys
  Hastelloy, 132.
  Hastelloy A, 54.
  Hastelloy B, 54, 77, 131, 154, 155, 165, 197, 227, 260, 265, 303.
  Hastelloy C, 50, 54, 62, 77, 131, 138, 154, 155, 197, 198, 256, 265, 303.
  Hastelloy D, 154, 303.
  Hastelloy F, 131, 134, 154, 198, 231, 303.
  Hastelloy N, 154, 196, 231, 299.
  Hastelloy R-235, 154, 155, 156, 196, 208, 258.
  Hastelloy W, 45, 155, 157.
  Hastelloy X, 45, 54, 154, 155, 196, 258, 259, 304, 311.
Haynes Stellite Alloys
  (*See also* Hastelloy)
  Stellite 1, 303.
  Stellite 3, 303.
  Stellite 6, 303.
  Stellite 6B, 310.
  Stellite 19, 303.
  Stellite 21, 303.
  Stellite 25, 54, 157, 198, 230, 258, 259, 303.
  Stellite 31, 156.
  Stellite 151, 156.
  Stellite 152, 297.
  Stellite X40, 127.
HE-1049, 156.
H Monel
  See Monel
HY-80, 154, 205, 295, 296.
HY-TUF, 54, 156.

Illium Alloys
  Illium 98, 231.
  Illium G, 154.
  Illium R, 154.
IN-100, 190, 225, 297.
Inco 700
  See Inconel 700
Inco 702
  See Inconel 702
Inco 901
  See Inconel 901
Incoloy Alloys
  Incoloy, 15, 16, 138.
  Incoloy 804, 16, 188.
  Incoloy 901, 125.
  Incoloy DS, 136.
Inconel Alloys
  Inconel, 18, 19, 21, 23, 42, 45, 47, 50, 54, 73, 77, 104, 105, 134, 138, 139, 154, 155, 165, 169, 196, 197, 198, 200, 227, 234, 265, 266, 267, 270, 311, 312.
  Inconel 700, 19, 101, 136, 154, 155, 156, 208, 227, 258.
  Inconel 702, 19, 154, 155, 196, 208, 230, 304.
  Inconel 713C, 102, 154, 155, 227, 299.
  Inconel 717C, 225.
  Inconel 718, 19.
  Inconel 901, 154, 155, 258.
  Inconel BP-85 Electrode
    See Inconel Welding Electrode 182
  Inconel BP-87 Filler Wire
    See Inconel Filler Metal 82
  Inconel Filler Metal 82, 46.
  Inconel W, 155, 227.
  Inconel Welding Electrode 182, 46, 200, 235.
  Inconel X, 19, 47, 98, 100, 136, 154, 155, 157, 196, 208, 227, 230, 260, 263, 270, 303, 304, 311.
INOR-8, 196, 231, 299.
  See also Hastelloy N
Invar, 33, 227.
Ionol, 177.

J8100, 45, 269, 270.
J8101, 270.
J8102, 269.
J8105, 270.
J8500, 45.
J8590, 270.
J8591, 270.
J8600, 45.

Kel-F, 309.
K Monel
  See Monel
Kovar, 221.
KPNi-1, 177.
Kunifer 5, 47.
Kunifer 20, 47.

LA-4, 103.
LaBelle HT, 227.
LM-5, 103, 104.

M-252, 154, 155, 156, 227, 230, 258.
M-308, 125, 258.
M-647, 125.
Magnegage Thickness Tester, 9.
Magnetoflex 20, 94.
Manganin, 229.
Mayari-R, 253.
Monel Alloys
  Monel, 18, 19, 21, 23, 47, 48, 50, 54, 73, 77, 82, 90, 108, 133, 134, 154, 165, 169, 170, 193, 197, 230, 231, 232, 265, 310.
  H Monel, 54, 310.
  K Monel, 51, 54, 154, 169, 258.
  S Monel, 54.
Multimet, 198.
Multimet N-155, 304.

N-80, 18.
N-155, 40, 54, 156, 157.
NA-22-H, 154.
N.C.C. Pig, 282.
N.H. Ingot, 282.
Nichrome, 256.
Nichrome V, 103.
Nickel
  220 Nickel, 84.
  A Nickel, 77, 100, 133.
  F Nickel, 282.
Nicrosilal, 63.
Nicrotung, 154, 225.
Ni-E Plating Solution, 146.
Ni-F 61 Plating Solution, 146.
Ni-Hard, 12, 34, 63, 122, 282, 294.
Nilo-K, 184.
Nimocast Alloys
  Nimocast 90, 226.
  Nimocast 258, 136, 225.
  Nimocast 713V, 225.
  Nimocast PE10, 225.
Nimonic Alloys
  Nimonic, 39, 102, 189, 200, 297, 300.
  Nimonic 75, 136, 154, 200, 297.
  Nimonic 80, 154, 189, 208, 297.
  Nimonic 80A, 136, 154, 200, 208, 229, 297.
  Nimonic 90, 127, 136, 154, 157, 200, 208, 227, 297.
  Nimonic 95, 154, 208, 297.
  Nimonic 100, 127, 136, 154, 156, 184, 297.
  Nimonic 105, 136, 225, 297.
  Nimonic 115, 225.
Ni-O-Nel, 19, 50, 77, 134, 138, 231, 264.
Ni-Resist Cast Irons
  Ni-Resist, 12, 77, 193, 282.
  Ni-Resist I, 194.
  Ni-Resist II, 194, 265.
  S.G. Ni-Resist, 63, 64.
Nitec, 120.
Nitralloy, 156.
Nitralloy N, 295.
NSB, 270.

Peerless 56, 157, 227.
Perflow Plating Solution, 146.
Perglow Plating Solution, 146.
Permalloy, 111, 184, 185.
Perminvar, 111.
P.H. 15-7 Mo
  See Armco
Plasmarc, 103.
Potomac A, 156.

RA-333, 128.
René 41, 44, 45, 124, 125, 154, 155, 227, 230, 258, 259, 311.

S-590, 124, 125.
S-816, 54, 124, 125, 227, 297.
Santoflex, 177.
S.G. Ni-Resist, 63, 64.
Silal, 63.
S Monel
  See Monel
Soco, 222.
Sonotone, 144.
Stainless W
  See U.S.S.
Stellite Alloys
  See Haynes Stellite
Super-Gleamax Plating Solution, 31.
Superston 40, 47.

T-1
  See U.S.S.
Teflon, 48, 309, 310.
Thermo-Kanthal, 103.
Thermold J, 68, 157.
ThermoSpray, 259.
Ticonal G, 185.
Timken Alloy, 19.
Timken 16-25-6, 227, 260.
Timken 17-22-AV, 100.
Tinidur, 300.
Tricent
  See 300M
Tri-Ten
  See U.S.S.
TRW 1800, 225.

U-500, 258.
U-700, 258.
Udimet 500, 100, 154, 155, 157, 227.
Udimet 700, 154, 155, 225, 227.
UHS 260, 156.
Uniloy 303MA, 172, 209.
Unimach II, 156.
Unitemp 212, 300.
Unitemp 1753, 154.
UOP 88, 177.
U.S.S. 12MoV, 134, 257.
U.S.S. Cor-Ten, 15, 135, 157, 188.
U.S.S. Stainless W, 188.
U.S.S. T-1, 39, 54, 188, 296.
U.S.S. Tri-Ten, 188.

V-36, 54.
V-57, 258.
Vascojet 1000, 156, 227, 304.
VMS 201, 138.

W-545, 156.
Waspaloy, 125, 154, 155, 156, 157, 193, 227, 258, 260, 304.

X8001, 159.
X-200, 39.

Yorcoron, 132.

Zircaloy 2, 139.

NAME INDEX TO VOLUME 34

Abegg, J. L. 177.
Abeledo, C. R. 185.
Achbach, W. P. 70, 155.
Achter, M. R. 65, 159.
Adamec, J. B. 270.
Ahearn, P. J. 64.
Albertin, L. 259.
Alco Products Inc. 268.
Alers, G. A. 82.
Alexander A. L. 232, 233.
Alley, C. W. 308.
Allied Chemical Corporation, 48.
Allsop, R. T. 187.
American Electroplaters' Society, 181, 214, 285, 291.
American Society for Testing Materials, 72, 144, 145, 147, 148, 149, 150, 216, 220, 285, 303.
Anaconda American Brass Company, 193.
Anderson, D. B. 171.
Anderson, J. S. 27.
Angerman, C. L. 79.
Antropov, L. I. 130.
Apert, C. 157.
Apperloo, M. 146.
Argent, E. J. 131.
Argyle, B. E. 185.
Asch, G. 185.
Ashbaugh, W. G. 47.
Athavale, V. T. 117.
Aul, E. L. 39.
Ault, R. T. 263.
Austin, A. E. 98.
Averbach, B. L. 176.
Avery, H. S. 43.
Axon, H. J. 153.
Ayres, G. H. 178.
Azada, K. 179.

Babbitt, R. W. 185.
Bach, B. B. 104, 184.
Bache, H. J. 28.
Bacquias, G. 89
Baerlecken, E. 75.
Baier, S. W. 8, 179.
Baird, S. S. 178.
Bakish, R. 18.
Ball, F. A. 200.
Banks, E. 184.
Bardell, P. R. 149.
Barker, J. F. 44.
Baron, H. G. 126.
Barrett, R. C. 61.
Barton, J. W. 9.
Barton, K. 135.
Barton, R. 63.
Barton, R. J. 68.
Bates, R. C. 295.
Battelle Memorial Institute, 38, 70, 104, 154, 155, 156, 157, 258, 297, 303.
Bayonne Research Laboratory, 37.
Beacom, S. E. 245.
Beasley, N. 142.
Beaton, J. L. 39.
Beattie, H. J. 124, 295.
Beaudry, B. J. 10.
Beaver, W. W. 5.
Bechtold, J. A. 243.
Bechtoldt, C. J. 120.
Beck, F. H. 194.
Beck, W. 68, 71.
Bell Laboratories, 84.
Bellobono, I. R. 289.
Belton, J. H. 303.
Bem, R. S. 132.
Bendel, S. H. 14.
Benning, A. C. 87.
Benninghoff, H. 146.
Benson, C. R. 201.
Berg, S. 308.
Bergdorf, W. H. 50.
Berge, P. 49.
Bergman, D. J. 169.
Bergman, P. A. 190.
Bernett, E. C. 40.
Berry, W. E. 139.
Bertorelle, E. 289.
Bieber, C. G. 190, 239.
Bienstock, D. 231.
Bigge, D. M. 29.
Bills, K. M. 82.
Birkle, A. J. 5.
Birks, L. S. 18, 195.
Birss, R. B. 27.
Blakely, J. M. 82, 176.
Blanc, G. M. 186.
Blanchard, R. 49.
Bland, J. 139.
Blank, J. M. 185.
Blasberg, Friedrich, 243.
Blickwede, D. J. 43.
Bloom, F. K. 73.
Bloomfield, B. S. 126.
Blum, W. 213.
Boeing Company, 258.
Bokros, J. C. 299.
Bonis, L. J. 13.
Boucher, M. 177.
Bouckley, D. 9, 179.
Boulger, F. W. 258.
Bourgault, P. L. 28.
Boutet, J. 289.
Bowen, R. K. 100.
Boyd, J. 60.
Brasher, D. M. 130.
Brauns, E. 164, 262.
Breckon, C. 132.
British Non-Ferrous Metals Research Association, 8, 216, 247, 284.
British Standards Institution, 69, 70, 85, 124, 217, 222.
Brook, P. A. 30, 58.
Brooks, W. W. 73.
Brown, H. 157.
Brown, K. P. 19.
Brown, N. 5.
Bru, A. 178.
Brugger, R. 243.
Brunhouse, J. S. 196.
Bruns, F. J. 197.
Bubba, L. F. 295.
Bundy, F. P. 192.
Bungardt, K. 196.
Bünger, J. 165.
Bunshah, R. F. 97.
Burbidge, H. G. 265.
Buss, G. 31.
Bylin, E. 266.

Cain, C. 17, 167.
Cameron, A. J. 212.
Campbell, H. C. 254, 310.
Campbell, H. S. 132.
Campbell, J. E. 305.
Campbell, R. B. 185.
Campbell, R. J. 311.
Camunas, A. 178.
Canadian Copper Refiners, Limited, 264.
Carey, J. D. 234.
Carlander, R. 260.
Carlin, F. X. 58.
Carns, C. L. 198.
Carolina Power & Light Company, 171.
Castell, H. C. 8, 28, 179.
Cech, R. E. 177.
Central Electricity Generating Board, 132.
Chambers, R. W. 264.
Chang, J. C. 35, 36.
Chapman, R. D. 70.
Char, T. L. R. 32, 90, 118, 119, 247, 292.
Chatten, C. K. 309.
Cheney, R. F. 261.
Chicago Bridge and Iron Company, 66.
Chikazumi, S. 92, 184.
Christian, J. L. 304, 306.
Cihal, V. 132.
Clarebrough, L. M. 83.
Clark, C. A. 94.
Clark, E. J. 267.
Clarke, S. G. 135.
Clauss, R. J. 57.
Coburn, S. K. 135, 201.
Cochran, E. P. 309.
Cohen, B. 68.
Cohen, M. 176, 187.
Cohen, M. S. 184.
Coldren, A. P. 100.
Cole, H. G. 132.
Collins, H. H. 151.
Colombier, L. 162.
Columbia Cellulose Limited, 198.
Conway, B. E. 28.
Cook, R. M. 226.
Copson, H. R. 41, 134.
Coren, R. L. 185.
Coriou, H. 72.
Cornell Aeronautical Laboratories, Inc., 162.
Couts, W. H. 44.
Cox, F. A. 258.
Croft, W. J. 184.
Cumberland, J. 33.
Curea, E. 85.
Curlook, W. 238.
Curtis, G. C. 266.

Daane, A. H. 10.
Dana, A. W. 73.
Dave, J. S. 178.
Davies, P. W. 294.
Day, G. F. 148.
Dayal, P. 143.
Decker, R. F. 239.
Deetscreek, V. D. 185.
Defense Metals Information Center, 38, 70, 104, 154, 155, 156, 157, 258, 297, 303.
DeMars, R. D. 148, 246.
Demeyre, H. F. 90.
Dench, W. A. 33.
Denhard, E. E. 73.
Dennison, J. P. 294.
Department of Scientific and Industrial Research, 87, 200.
De Rudder, J. 286.
Dettner, H. W. 244.
Devries, G. 246.
Diederichsen, J. 164.
Dietrich, H. 251, 265.
Dirian, J. 72.
Dixon, R. H. T. 34, 282.
Domis, W. F. 161.
Domnikov, L. 88, 248.
Dormer, G. J. 253.
Doughty, S. E. 47.
Downey, J. W. 87.
Duddy, J. C. 240.
Duga, J. J. 5.
DuRose, A. H. 58, 88.
Düsing, W. 33.
Dutt, N. K. 86.
Dwight, A. E. 56.

Eastwood, G. W. 94.
Economy, G. 194.
Edeleanu, C. 71, 131.
Edward Valves, Inc. 302.
Edwards, W. T. 133.
Edwin, B. 103.
Eisenbrown, C. M. 76, 165.
Eldorado Mining and Refining Limited, 264.
Electro-Chemical Engineering Company, Ltd. 28.
El-Gendi, S. 179, 246.
El-Ghandour, M. F. M. 32.
Elliott, J. F. 13, 83.
Elze, J. 241.
Engel, R. D. 51.
Engell, H.-J. 137, 197.
Ernst, D. W. 181.
Evans, G. J. 132.
Evans, R. M. 104.

Farquhar, J. 98
Faulkner, G. E. 296.
Faust, C. L. 59.
Favor, R. J. 70, 155.
Fawcett, J. A. 259.
Fedder, D. O. 56.
Feduska, W. 125.
Fell, E. A. 189.
Feller, H. G. 49.
Ferguson, J. 143.
Field, J. H. 231.
Findeisen, G. 223.
Fink, F. W. 48, 79.
Firestone, J. T. 50.
Fisher, A. O. 198.
Fisher, J. I. 254.
Flanders, P. J. 185.
Fleischmann, W. L. 267.
Flemings, M. C. 64.
Flinn, R. A. 157, 158.
Flint, G. N. 76, 117, 288.
Flippen, R. B. 5.
Fontana, M. G. 71, 131, 194.
Forbes, S. S. 264.
Ford Motor Company, Ltd. 9.
Forgeson, B. W. 232, 233.
Foster, M. L. 92.
Fox, Samuel and Company, Ltd. 301.
Francis, J. T. 104.
Franck, U. F. 131.
Francombe, M. H. 184.
Freche, J. C. 70.
Freeman, J. W. 100.
Freeport Sulphur Company, 238.
Friend, Z. 73.
Frost, H. B. 84.
Fueki, K. 41, 192.
Fuller, H. W. 185.
Fuller, R. M. 74.
Furukawa, A. 41.

Garmon, L. B. 291.
Garnier, J. 147.
Garofalo, F. 161.
Garwood, M. F. 44.
Gary, S. P. 57.
Gattringer, R. 152.
Gaul, C. G. 188.
Geerlings, H. G. 131.
Geller, S. 10.
General Dynamics Corporation, 199.
General Electric Company, 262, 311.
General Motors Corporation, 60, 147.
Gerstner, D. 185, 251.
Geyer, N. M. 68.
Gibbons, E. V. 233.
Gibbons, H. P. 54.
Gibbs, T. W. 228.
Gibson, J. G. 131.
Gibson, N. A. 212.
Gilbert, G. N. J. 95.
Gilbert, P. T. 132.
Gillig, F. J. 162.
Gilliland, H. J. 44.
Gittus, J. H. 186.
Glab, P. 57.
Gladis, G. P. 77.
Glass, H. M. 284
Gleekman, L. W. 121.
Glenny, E. 225.
Glover, S. G. 36.
Gobin, F. 231.
Godby, L. L. 303.
Goetzel, C. G. 97.
Goldspiel, S. 92.
Gonzalez, O. D. 251.
Goodall, R. 187.
Gordon, H. E. Z. 186.
Gordon, L. 85.
Gould, G. C. 295.
Gouwens, P. R. 102.
Graft, W. H. 102.
Graham, A. K. 62.
Graham, C. D. 184.
Grala, E. M. 5, 7.
Grall, L. 72.
Gran, B. E. 184.
Grange, R. A. 186.
Grant, N. J. 13, 256.
Grecu, I. 85.
Green, L. 5.
Greenblatt, J. H. 133.
Greene, N. D. 131.
Greifer, A. P. 185.
Grenier, E. G. 249.
Griffin, J. E. 144.
Griffiths, J. A. 42.
Grilliat, J. 63, 287.
Grimes, C. G. 240.
Grinthal, R. D. 6.
Grover, H. J. 70.
Groves, N. D. 76, 165.
Grube, K. R. 183.
Guard, R. W. 5.
Gulavane, S. V. 117.
Gunkler, A. A. 77.
Gurklis, J. A. 303.
Gurnea, R. F. 267.
Gut, K. 252.
Gyorgak, C. A. 101.

Hackerman, N. 130, 261.
Haerdi, W. 105.
Hagel, W. C. 124.
Hahn, E. L. 185.
Hall, E. R. 234.
Hall, G. D. 78.
Hall, N. 28.
Hamilton, W. F. 69.
Hammad, F. H. 148.
Hammer, W. 233.
Hammond, C. M. 157.
Hammond, R. A. F. 69, 90.
Hancock, P. 136.
Handelsmann, V. 85.
Haneef, M. 15.
Hanson, M. P. 307.
Hardesty, D. W. 59.
Hardwick, D. 36, 255, 283.
Hardy, R. W. 59.
Hargreaves, M. E. 83.
Harris, E. P. 87.
Harrison, S. E. 185.
Harshaw Chemical Company, 88, 146.
Hart, R. K. 159.
Hartkamp, H. 86.
Harwood, J. J. 74.
Haskins, A. F. 104.
Hauser, L. A. 172.
Häussler, G. 158.
Hayfield, P. C. S. 135.
Hayford, A. W. 308.
Hecht, G. 255.
Hehemann, R. F. 122.
Henkel, O. 221.
Henning, H. J. 258.
Henriksson, S. 308.
Henry Wiggin and Company, Ltd. 39, 102, 200.
Hentze, H. 11.
Herbert, W. S. 240.
Hérenguel, J. 40.
Herr, F. J. 35, 36.
Heuvel, J. A. v.d. 146.
Heydt, G. B. 257.
Heyduk, M. J. 159.
Heymer, G. 33.
Higgins, G. T. 153.
Hill, M. L. 68.
Hill, W. H. 227.
Hinde, J. 200.
Hindson, E. 186.
Hirano, K. 176.
Hoag, J. G. 297.
Hochgraf, F. G. 261.
Hockwalt, C. A. 142.
Hoffman, R. R. 264.
Holetzko, H. 128.

Holmberg, E. G. 188.
Holmberg, M. E. 73.
Holmen, J. O. 184.
Honda, R. 6.
Hopkinson, B. E. 41.
Hoppin, G. S. 45, 259.
Hospadaruk, V. 180.
Howells, E. 17, 75.
Hudson, F. 120.
Hudson, J. C. 131.
Hulmann, J. 107.
Humbert, J. C. 83.
Humenik, M. 13.
Hurd, R. M. 130.
Hurlich, A. 199.
Hutchinson, R. 4.

Ibl, N. 240.
Institute of Metal Finishing, 284.
International Nickel Company of Canada, Limited, 142, 238, 264.
International Nickel Company, Inc., 122, 171, 180, 200.
International Nickel Company (Mond), Ltd. 37, 66, 282, 290, 294.
Irvine, K. J. 299.
Ishibashi, H. 192.
Ishikawa, T. 131.
Isleib, C. R. 150.
Iwama, Y. 250.

Jackson, R. M. 256.
Jackson, W. J. 223.
Jaffee, R. I. 183.
Jahnke, L. P. 44.
Jankowsky, E. J. 68.
Jellinghaus, W. 191.
Jenkins, W. D. 193.
Johnson, H. H. 38, 295.
Johnston, J. R. 101.
Jonakin, J. 16.
Jonas, P. G. 39.
Jones, E. S. 44.
Jones, M. H. 214.
Jones, O. J. 284.
Jones, R. B. 62.
Jongebruer, J. C. 131.
Julien, C. A. 185.
Juretschke, H. J. 185.

Kaesmacher, P. 104.
Kallas, D. H. 309.
Kampschulte, W., et Cie, 146.
Kaneko, T. 93.
Kaplish, B. K. 106.
Kappelt, G. F. 99.
Karmitz, P. 177.
Karpen, W. L. 193.
Karuppanan, N. 92.
Katz, W. 288.
Kauhausen, E. 104.
Kay, E. 184.
Kearns, W. H. 39.
Kee, H. L. 71.
Kelly, P. M. 130.
Kennedy, D. S., and Company, 38.
Kennedy, W. R. 12.
Kern, F. 18.
Kern, H. E. 84.
Keyser, W. B. 144.
Kihlgren, T. E. 190.
King, E. J. 99.
King, H. W. 36.
Kinsley, E. J. 50.
Kirtchik, H. 192.
Kitagawa, T. 86.
Kleber, E. V. 249.
Klemperer, D. F. 27.
Klier, E. P. 307.
Kneller, E. 185, 251.
Koh, P. K. 18, 185.
Koonitz, D. E. 56.
Kornilov, I. I. 6.
Korostoff, E. 184.
Köster, W. 250.
Kouvel, J. S. 185.
Krainer, E. 96.
Krainer, H. 106.
Kranzlein, P. M. 79.
Kriessman, C. J. 185.
Krijl, G. 91.
Krogmann, K. 213.
Kroneis, M. 152.
Kronenberg, K. J. 185.
Krubsack, W. L. 5.
Kruse, P. 258.
Kubaschewski, O. 33.
Kuilenberg, B. J. 245.
Kurg, I. M. 98.
Kutzelnigg, A. 180, 245.
Kuznetsov, V. I. 248.

Ladley, R. S. 18.
Lake, D. E. 77.
La Manna, F. J. 31.
Lander, J. J. 240.
Langbein-Pfanhauser Werke A.G. 146.
Langston, M. E. 154.
LaQue, F. L. 73, 170, 242, 263.
Larkin, C. F. 55.
Larrabee, C. P. 135. 201.
Larson, F. R. 37, 65.
Laub, H. 245.
Lawless, G. W. 68.
Lawrence, S. C. 68.
Layton, D. N. 290.
Lee, E. W. 27.
Lefever, R. A. 86.
Leidheiser, H. 291.
Lelong, P. 40.
Lemaire, H. P. 184.
Lennartz, G. 163.
Lessoff, H. 185.
Levine, M. 68.
Lewis, H. 135.
Lewis, W. J. 296.
Li, C. H. 14, 283.
Libsch, J. F. 67.
Lichtman, J. Z. 309.
Lilley, J. N. 264.
Lindley, G. 149.
Lismer, R. E. 47.
Littlewood, R. 71, 131.
Llewellyn, D. T. 299.
Logan, H. L. 166.
Lommel, J. M. 184.
Long, R. A. 268.
Long, S. A. 50.
Longhurst, E. E. 135.
Longo, R. E. 178.
Lorenz, K. 75.
Loretto, M. H. 83.
Lovell, W. E. 60.
Lowe, J. B. 137.
Luce, W. A. 97.
Luchok, J. 129.
Ludwigson, D. C. 155.
Luke, C. L. 86.
Lüling, H. 252.
Lund, C. H. 154.

Machu, W. 32, 179, 246.
Mack, D. J. 5.
MacLennan, D. F. 133, 160, 195.
Malinofsky, W. W. 185.
Manning, C. R. 257.
Manning, G. K. 98, 297.
Marble, J. D. 39.
Maringer, R. E. 98.
Marron, A. J. 74, 96.
Marshall, W. A. 69.
Mason, J. F. 42.
Masterson, H. G. 132.
Matas, S. J. 122.
Matcovich, T. 184.
Matheny, J. H. 39.
Mathur, P. B. 30, 92.
Matuschka, B. 130.
Maxton, J. 128.
Mayne, C. R. 304.
McAndrew, J. B. 5.
McClintock, R. M. 54.
McCoy, C. W. 161.
McDonald, G. W. G. 169.
McDougall, W. S. 200.
McDowell, D. W. 15.
McGraw, L. D. 303.
McIntosh, R. B. 264, 309.
McMaster, W. D. 135.
McMillan, A. F. 133.
McNary, T. A. 17.
Mead, A. R. 51.
Mears, R. B. 134.
Meiklejohn, W. H. 185.
Melbourne, S. H. 117.
Melse, J. L. 91.
Merrick, R. D. 15.
Merz, A. 107.
Metal Finishing Association, 284.
Methfessel, S. 185.
Metzger, M. C. 172.
Metzger, W. 243.
Meyer, A. J. P. 185.
Michaelis, R. E. 260.
Middelhoek, S. 185.
Mihalisin, J. R. 15, 169.
Millar. N. S. C. 119.
Miller, D. R. 311.
Miller, H. R. 59.
Miller, J. 258.
Miller, K. O. 13.
Miller, W. G. L. 9, 179.
Mills, R. 4.
Minga, R. W. 266.
Mingarro, E. 178.
Ministry of Aviation, 224, 225.
Mishler, H. W. 96.
Mitchell, J. B. 264.
Mobley, P. R. 269.
Modjeska, R. S. 57.
Moisan, J. 40.
Mongahela Power Company, 168.
Monnier, D. 105.
Monroe, R. E. 96, 312.
Monsees, R. G. 258.
Monteil, V. H. 258.
Moon, D. P. 156, 220.
Moore, N. E. 42.
Moran, J. J. 42, 169.
Morisset, P. 287.
Morley, F. J. 295.
Morral, F. R. 155.
Morris, R. A. 87.
Morris, R. J. 44.
Moskowitz, A. 230.
Müller, H. 242.
Müller, K. 146.
Murgulescu. I. G. 134.
Mykura, H. 82, 176.

Nakada, Y. 185.
Nakashima, A. 67.
Nakayama, T. 256.
National Advisory Committee for Aeronautics: *See* National Aeronautics and Space Administration
National Aeronautics and Space Administration, 70, 98, 101, 227, 257, 307.
National Bureau of Standards, 54, 166, 285.
National Research Council of Canada, 233.
Neighbours, J. R. 82.
Nelson, P. G. 44,.
Nelson, W. 17, 167.
Neuhold, H. 213.
Nevitt, M. V. 87.
Newell, I. L. 30.
Nichols, H. R. 102.
Nickel, O. 122.
Nippes, E. F. 35.
Nixon, C. F. 59.
Nohse, W. 242.
Nole, V. F. 249.
Noreika, A. J. 184.
North American Aviation, Inc., 258.
Norton, G. R. 253.
Novy, V. F. 249.
Nunes, J. 37, 65.
Nutting, J. 130.

Oak Ridge National Laboratory, 299.
Ogburn, F. 91, 181.
Ogle, M. R. 265.
Okamoto, G. 131.
Oliver, E. M. 217.
Olofson, C. T. 38.
Olsen, K. H. 185.
Olsen, K. M. 55.
Olson, J. H. 70.
O'Neill, H. 64.
Oppenheim, R. 196.
Osterwald, J. 212.
Owczarski, W. A. 35, 104, 139, 200.
Owen, L. W. 89.

Page, G. G. 132.
Paine, R. M. 5.
Panikkar, S. K. 32, 118.
Pannetier, G. 177.
Parpan, W. 287.
Parr, J. G. 9, 249.
Pashley, D. W. 5.
Patel, A. R. 178.
Patton, A. M. 193.
Pätzold, V. 158.
Paul, G. T. 74.
Paxton, H. W. 133.
Payne, B. S. 253.
Peacock, J. H. 97.
Pearl, H. A. 99.
Pearl, W. L. 188.
Pehlke, R. D. 83.
Pell, R. H. 168.
Pellisier, J. 49.
Pennington, W. A. 65.
Pennington, W. J. 125.
Penrice, P. J. 226.
Petrocelli, J. V. 180.
Petty, E. R. 63.
Phelps, E. H. 134.
Phillips, N. D. 14, 260.
Phillips, V. A. 62.
Pickering, F. B. 299.
Pickering, H. W. 71.
Pluchery, M. 49.
Poirot, R. 63.
Polderman, L. D. 78.
Portis, A. M. 185.
Posch, K. 96.
Potter, R. F. 5.
Pourbaix, M. 71.
Powell, R. W. 40.
Prall, J. K. 91.
Pratt and Whitney Aircraft, 303.
Presland, A. E. R. 5.
Price, H. L. 257.
Prince, E. 184.
Prosen, R. J. 184.
Protheroe, H. T. 106.
Prutton, M. 11.
Pryle, W. H. 163.
Prytherch, J. C. 95.
Pugh, E. W. 185.
Pulsifier, V. 102.
Purdy, G. R. 9, 249.
Purdy, S. M. 308.

Racine, F. L. 147.
Radavich, J. F. 125, 190.
Radiation Enamels Limited, 119.
Radovici, O. 134.
Ramchandran, T. 137, 197.
Rea, A. E. 142.
Read, H. J. 68.
Redmerski, L. 230.
Reed, R. E. 133.
Reese, J. T. 16.
Remde, H. F. 185.
Renout, M. 289.
Reuther, T. C. 159.
Reynolds, P. M. 247.
Rhines, F. N. 248.
Rhoda, R. N. 270.
Riccio, V. 288.
Rice, G. A. 16.
Rice, L. P. 305.
Richardson, W. H. 266.
Ridal, E. J. 223.
Riederman, N. H. 184.
Rienaecker, G. 212.
Rieppel, P. J. 96, 296.
Riggs, O. L. 131.
Riley, B. J. 245.
Riley, T. J. 70.
Ringpfeil, H. 221.
Roach, A. G. 264.
Robb, K. G. 142.
Roberts, D. A. 155, 297.
Roberts, M. W. 131.
Roberts, S. I. 154.
Roberts, W. F. 128.
Roberts, W. H. 91.
Robertson, W. D. 249.
Roesch, K. 105, 197.
Rogers, T. H. 108, 132.
Röllig, H. 107.
Roloff, G. 212.
Romanchuk, S. 264.
Roorda, H. J. 238.
Rosenfel'd, I. L. 135.
Ross, P. B. 171.
Roth, E. 244.
Roy, T. K. 238.
Royal Mint, 62, 248.
Rubenstein, H. 185.
Rudy, J. F. 254.
Ruediger, B. A. 139.
Ryan Aeronautical Company, 258.

Sachs, G. 304.
Saddington, R. R. 238.
Sadowski, S. 104.
Safranek, W. H. 59.
Saiddington, J. 214.
Sakakura, A. 250.
Salesin, E. D. 85.
Salkind, A. J. 240.
Sallo, J. S. 185.
Salvaggi, J. 162.
Sample, C. H. 242, 285.
Sanders, V. J. 69.
Sartell, J. A. 14, 283.
Sato, H. 82.
Savage, R. E. 294.
Savage, W. F. 35.
Savitskii, E. M. 5.
Sawyer, J. C. 138.
Schaffer, P. S. 64.
Schaller, F. W. 12.
Schane. H. P. 47.
Scharfstein, L. R. 76, 165.
Schleuning, H. W. 184.
Schmeckenbecher, A. 184.
Schmid, G. M. 261.
Schmidt, F. W. 98.
Schmitt, P. H. 55.
Schmitz, K.-H. 105.
Schneider, W. R. 38.
Schoefer, E. A. 51.
Schoeller-Bleckmann Stahlwerke, A.G 130.
Schoening, F. R. L. 185.
Schröder, K. 293.
Schuele, W. J. 185.
Schumacher, V. 229.
Schumann, H. 152.
Schwab, G.-M. 5.
Schwabe, K. 71, 255.
Schwartz, M. 60.
Schwartzbart, H. 254.
Schwenk, W. 164, 262.
Scott, B. E. 31.
Scott, H. F. 308.
Scott, W. M. 197.
Seabrook, J. B. 122.
Seebold, R. E. 195.
Segmuller, A. 184.
Seiden, J. 55, 148.
Selwood, P. W. 185.
Semmel, J. W. 39.
Sen Sarma, K. P. 86.
Seraphim, D. P. 29.
Sessler, J. G. 304.
Seyb, E. J. 60.
Shahinian, P. 65, 159
Sharan, R. 143
Sheehan, J. P. 254
Sheepbridge Alloy Castings Limited, 34
Shepherd, C. C. 55
Sherrit Gordon Mines Limited, 264, 309
Sherwin, J. 266
Shigematsu, T. 86
Shimmin, K. D. 227
Shimuzu, T. 179
Shock, D. A. 131
Shotwell, E. H. 60
Shrier, L. L. 91
Shulman, R. G. 185

Siegmund, J. M. 48
Silber, L. M. 184
Silverstone, N. M. 184
Simkovich, A. 161
Simmons, W. F. 156, 220.
Siomkajlo, J. M. 18.
Sircar, S. C. 4.
Skinner, E. N. 42, 169.
Smallen, H. 128, 267.
Smith, D. O. 184.
Smith, G. F. 226.
Smith, G. T. 227.
Smith, R. A. 136.
Smith, R. N. 12.
Smith, R. W. 227.
Smith, T. B. 19, 187.
Snavely, C. A. 68.
Snowden, P. P. 74.
Sobers, W. B. 80.
Society of Automotive Engineers, 54.
Soohoo, R. F. 185.
Southwell, C. R. 232, 233.
Speiser, R. 194.
Spencer, C. W. 261.
Spindler, H. 107.
Sponseller, D. L. 158.
Spooner, R. C. 29.
Springsteen, D. F. 101.
Spyra, W. 229.
Sree, V. 90, 247.
Stadelmaier, H. H. 148, 249.
Stehsel, M. L. 5.
Steiger, A. J. 32.
Stein, E. M. 297.
Steinmetz, R. W. 57.
Stemann, L. 233.
Stephen, W. I. 10.
Stephenson, E. T. 187.
Stevenson, D. A. 143.
Sticha, E. A. 302.
Stiegerwald, E. A. 12.
Stöcker, U. 242.
Stoffels, H. 262.
Stolarczyk, J. E. 293.
Stone, E. L. 259.
Stonehouse, A. J. 5.
Störing, O. 30.
Stout, R. D. 83, 295.
Stover, H. E. 310.
Strassburg, F. W. 95.
Such, T. E. 291.
Sudbury, J. D. 131.
Sugiyama, M. 256.
Sullivan, D. L. 185.
Suss, H. 75.
Sutton, F. 108.
Suyama, F. 254.
Swales, G. L. 230.
Swandby, R. K. 121.
Swearingen, F. H. 192.
Sweet, J. W. 35, 36.
Swindeman, R. W. 299.

Tabushi, M. 86.
Taft, B. L. 303.
Taggart, R. 9.
Takeda, S. 250.
Takeyama, H. 199.
Taoka, T. 6.
Tedds, D. F. B. 97.
Tegart, W. J. McG. 283.
Templeton, H. C. 197.
Tesquet, G. 177.
Thomas, C. O. 56.
Thomas, H. 185.
Thomas, J. D. 59.
Thomas, J. S. 187.
Thomassen, L. 157.
Thompson, D. H. 199.
Thompson, J. F. 142.
Thorneycroft, D. R. 200.
Thümmler, F. 107.
Tikkanen, M. H. 132.
Tillu, M. M. 117.
Tilney-Bassett, J. F. 117.
Titus, G. W. 196.
Tolman, E. M. 185.
Torkar, K. 213.
Towndrow, E. G. 4.
Tremblay, R. J. 264.
Troiano, A. R. 12.
Trueb, L. F. 240.
Trümpler, G. 240.
Tsu, I. 182.
Turkalo, A. M. 5.
Turnbull, R. C. 185.
Turton, J. 95.
Tuthill, A. H. 170.
Tye, R. P. 40.

Udylite Corporation, 28, 243.
Uhlig, H. H. 49, 194, 212, 261.
Ulrich, W. 250.
Underwood, E. E. 98, 297.
Union Carbide Chemicals Company, 47.
UNIPREA, 283.
United Kingdom Atomic Energy Authority, 133.
University of Michigan, 158.
Univertical Corporation, 215.
U.S. Air Material Command, 102.
U.S. Army, 144.
U.S. Atomic Energy Commission, 159, 200, 234, 268, 299.
U.S. Naval Engineering Experiment Station, 256.
U.S. Naval Research Laboratory, 232.
U.S. Navy, 108, 162.
U.S. Steel Corporation, 66.
Uusitalo, E, 130.

Vacher, H. C. 120.
Vaid, J. 292.
Van Dijck, A. P. 286.
Van Peteghem, A. P. 90.
Van Rooyen, D. 133.
Varga, J. 38.
Vasu, K. I. 119.
Vaughan, D. E. 139.
Vermilyea, D. A. 131.
Vernon, M. J. 4.
Vetter, W. H. 139.
Vickery, R. C. 249.
Vogel, J. 105.
Von den Steinen, A. 151.
Von Gemmingen, F. 161.
Voss, G. 243.
Vreeland, D. C. 78, 188.

Wagner, C. 292.
Wagoner, C. L. 14, 260.
Wakiyama, T. 92.
Walker, J. L. 213.
Wallace, W. E. 87.
Waller, C. E. 5.
Wanklyn, J. N. 159.
Wasilik, J. H. 5.
Waters, B. H. C. 95.
Waters, W. J. 70.
Watson, J. F. 79, 199, 304, 306.
Watson, S. A. 56, 288.
Waxweiler, J. H. 40.
Weare, N. E. 312.
Webb, C. E. 221.
Webb, H. W. 4.
Weger, M. 185.
Weil, R. 89.
Weiner, R. 145.
Weisenberg, L. A. 44.
Weismantel, E. E. 47, 233.
Weiss, G. P. 184.
Weissmantel, C. 255.
Welding Research Council, 38.
Wernick, J. H. 10.
Wertheim, G. K. 185.
Wessel, E. T. 163.
West, F. G. 185.
West, G. W. 83.
Westbrook, J. H. 4, 5.
Westinghouse Electric Corporation, 126.
Weston, G. 284.
Wetzlar, K. 163.
Weyerhaeuser Company, 198.
Whalen, T. J. 13.
White, D. E. 17.
White, E. L. 48, 79, 139.
White, J. E. 100.
White, R. A. 216.
Whiteley, R. L. 43.
Whitmore, R. W. 161.
Whittle, J. E. 282.
Wiederholt, W. 135.
Wiegand, H. 11.
Wiggin, Henry, and Company, Ltd. 39 102, 200.
Wilcock, J. 182.
Wilcox, B. A. 227.
Wilcox, W. L. 254, 310.
Wiles, D. R. 4.
Wilkins, D. H. 143.
Wilkins, N. J. M. 159.
Willard, W. A. 193.
Williams, C. 90.
Williams, D. N. 183.
Wilson, J. E. 190.
Wilson, R. A. 44.
Wilson, R. H. 185.
Winkler, J. V. 44.
Winterton, K. 253.
Witherell, C. E. 45.
Wlodek, S. T. 103.
Wolf, P. 184.
Wollam, J. S. 87.
Wood, D. L. 6.
Woolfall, R. J. 182.
Wray, P. J. 248.
Wright Air Development Center, 40, 48, 97, 98, 99, 100, 230, 263.
Wulff, J. 143.
Wyatt, H. W. 228.
Wyman-Gordon Company, 129.

Yamaguchi, S. 33.
Yamamoto, Y. 86.
Yasukôchi, Y. 6.
Youden, W. J. 193.
Young, C. E. 264.
Yukawa, S. 65.
Yun, T. S. 249.

Zentner, V. 61.
Zijlstra, H. 185.
Zwilsky, K. M. 256.

PATENTS INDEX

Agamennone, M. 109.
Aggen, G. 277.
Air Preheater Corporation, 279.
Air Reduction Company, Inc., 205.
Aktiengesellschaft für Unternehmungen der Eisen - und Stahl - industrie, 24.
Allegheny Ludlum Steel Corporation, 277.
Alpha Metal Laboratories, Inc., 110.
American Brake Shoe Company, 203.
American Steel Foundries, 205, 275.
Archambault, M. 20.
Armco Steel Corporation, 207.
Armiento, D. F. 111.
Asherman, C. D. 205.
Atomic Energy of Canada, Limited, 24.

Bacon, F. T. 272.
Bailey, N. 274.
Barber, J. B. 111, 112.
Barkman, E. F. 109.
Beck, F. H. 278.
Bell Telephone Laboratories, Inc., 111.
Benoit, R. L. 271.
Bidwell, L. R. 278.
Binder, H. G. 209.
Birmingham Small Arms Corporation, 23.
Bishop, C. R. 209.
Bolton, W. M. 273.
Bouly, H. G. 275.
Bounds, A. M. 202.
Bowman, G. B. 273.
Breining, E. R. 110, 273.
Brown, J. T. 207, 277.
Bruce, Lawrence Richard, Inc., 20.
Bryant, E. E. 203, 271.
Burbank, R. D. 111.
Buttress, R. E. 275, 277.

Carius, C. 24.
Carlson, A. M. 110.
Carman, C. M. 111.
Carpenter Steel Company, 112.
Certa, A. J. 274.
Chang, W. H. 205.
Chemplate Corporation, 22.
Chicago Development Corporation, 204.
Child, H. C. 23.
Cieslicki, M. E. 23.
Clarke, W. C. 207.
Cochardt, A. W. 277.
Commissariat à l'Energie Atomique, 209.
Commonwealth Engineering Company of Ohio, 110.
Conway, C. G. 272.
Cooper Alloy Corporation, 209.
Corning Glass Works, 204.
Corsi, L. 109.
Crafts, W. 112.
Crane Company, 278.

Daley, J. L. S. 272.
Dean, R. S. 204.
De Long, H. K. 204.
Department of Mines, Province of Quebec, 20.
Deutsche Gold - und Silber - Scheideanstalt, 276.
Dies, K. 275.
Dixon, R. H. T. 274.
Dow Chemical Company, 204.
Dunn, E. L. 23, 206.
Duraloy Company, 23.
Dyrkacz, W. W. 277.

Elbaum, S. K. 276.
Electric Storage Battery Company, 272.
Emery, C. H. 112.
Ericson, H. 273.

Felmley, C. R. 205.
Ferro Corporation, 203, 271.
Fontana, M. G. 278.
Ford, I. A. M. 22.
France, L. L. 277.
Franklin, A. W. 111, 112.
Fussell, L. E. 203.

Gallery Chemical Company, 21.
General Electric Company, 20, 23, 203, 205, 206, 278.
General Motors Corporation, 205, 208.
Gittus, J. H. 206.
Greene, J. L. 208.

Haefner, K. 278.
Hall, A. M. 207.
Hammond, M. B. 273.
Hanink, D. K. 208.
Hannah, J. D. 111.
Harris, G. T. 23.
Heidenrich, R. D. 111.
Hoefer, H. W. 208.
Hoff, R. L. 202.
Hoke, R. M. 21.
Holzwarth, J. C. 208.
Hoppin, G. S. 278.
Horne, C. C. 277.
Hoyt, W. R. 22.
Hughes, H. D. 203.

Imperial Chemical Industries, Limited, 204, 205.
Institut Dr. Ing. Reinhard Straumann A.G., 204.
International Nickel Company of Canada, Limited, 202, 271.
International Nickel Company (Mond), Limited, 112, 274, 275.
See also Mond Nickel Company, Limited.

Jessop, William, and Sons, Limited, 23.
Junker, O. 209.

Kanter, J. 278.
Keegan, B. 277.
Kegerise, W. R. 112.
Kemiska Aktiebolaget, 273.
King, E. V. 272.
Koffskey, J. M. 276.
Korchynsky, M. 112.

Lahr, A. F. 278.
Leeds and Northrup Company, 276.
Lewis, H. 112.
Lewis, R. W. 203.
Lin, W. C. 271.
Lochmann, G. 21.
Ludwigson, D. C. 207.
Lukens Steel Company, 206.
Luster, V. R. 271.
Lustig, B. 20.

Macewan, J. U. M. 20.
Mackiw, V. N. 271.
Magneto-Chemie, N. V., 202.
Marx, U. F. 21.
Melpar Inc., 204.
Metachemical Processes Limited, 203.
Metcalfe, K. 112.
Michael, F. L. 203.
Mickelson, C. G. 205.
Miltenberger, P. 21.
Minnesota Mining and Manufacturing Company, 21.
Mitchell, R. H. 205.
Mochel, J. 204.
Möckel, J. 274.
Mond Nickel Company, Limited, 20, 21, 22, 111, 112, 206.
See also International Nickel Company (Mond), Limited.
Montecatini (Soc. Gen. per l'Industria Mineraria e Chimica), 109.
Moore, D. C. 204.
Moore, D. G. 203.
Moore, J. B. 23.
Morgan Crucible Company, Ltd., 24, 276.
Morton, H. C. 208.
Mott, N. S. 209.
Mueller, C. P. 277.
Muller, A. 205.
Murray, J. D. 277.

National Research Development Corporation, 272.
Neely, W. L. 206.
Nesbitt, E. A. 111.

Obrowski, W. 276.
Ohio State University Research Foundation, 278.
Oliver, E. M. 203.
Olivier, C. A. 20.
Orenda Engines Limited, 208.

Pelton, J. F. 276.
Perkins, R. A. 209.
Philco Corporation, 274.
Phillips Electrical Industries, Limited, 22.
Platecraft of America, Inc., 110.
Potter, W. W. 110.
Pritchard, R. E. 208.
Prymula, C. E. 110.

Ramirez, E. R. 109.
Reiff, C. J. 203.
Renold Chains Limited, 111.
Republic Steel Corporation, 207.
Reynolds, E. E. 277.
Reynolds Metal Company, 109.
Ringpfeil, H. 274.
Ritt, P. E. 204.
Ritzema, D. E. 204.
Roach, D. B. 207.
Robinson Brothers, Limited, 22.
Robinson, P. 110.
Rockwell-Standard Corporation, 277.
Ruben, G. E. F. 20.
Runton, L. A. 208.
Russell Manufacturing Company, 208.

Salt, A. E. 205.
Scherzer, K. 209.
Schwyn, R. E. 205.
Sherritt Gordon Mines Limited, 271.
Sherwood, B. J. 22.
Shoudy, A. A. 208.
Siemens and Halske, A.G., 21.
Sierra Metals Corporation, 207.
Simonds Saw and Steel Company, 112.
Simpson, A. B. 20.
Smith, A. O., Corporation, 203.
Smith, H. C. 111.
Smith, T. R. 272.
Southin, R. T. 274.
Sprague Electric Company, 110.
Steatit-Magnesia A.G., 23.
Stone, J., and Company (Propellers) Ltd., 274.
Straumann, R. 204.
Strong, H. M. 20.
Stuart, G. R. 277.
Sullivan, J. D. 203.
Superior Tube Company, 202.

Tanczyn, H. 207, 278.
Taylor, E. A. 204.
Thorneycroft, D. R. 274.
Timken Roller Bearing Company, 274.
Toulmin, H. A. 273.
Townshend, S. C. 20.
Tripp, H. P. 203.

Union Carbide Corporation, 110, 112, 209, 272, 273, 276.
United States Steel Corporation, 278.
United Steel Companies Limited, 277.
Universal-Cyclops Steel Corporation, 112, 209.
U.S. Atomic Energy Commission, 111, 275.
U.S. Secretary of the Air Force, 203.
U.S. Secretary of the Army, 111.

Vereinigte Deutsche Metallwerke A.G. 275.
Von Seelen, C. 276.

Wagoner, E. L. 276.
Washken, E. 208.
Webb, A. W. O. 274.
West, D. H. 20.
Westinghouse Electric Corporation, 206, 207, 277.
White, A. E. S. 276.
Whitmer, V. W. 207.
Wiggin, Henry, and Company, Limited, 277.
Wilbur B. Driver Company, 111.
Wilmot-Breedon, Limited, 21.
Wilson, J. E. 23, 206.
Withers, J. C. 204.
Wlokka, H. 205.
Worn, D. K. 275.

Attention is drawn to the fact that many of the names of materials mentioned in The Nickel Bulletin are *Trade Marks*.

A Publication prepared by the

DEVELOPMENT AND RESEARCH DEPARTMENT

of

THE INTERNATIONAL NICKEL COMPANY (MOND) LIMITED

PRINTED IN ENGLAND *by* WIGHTMAN MOUNTAIN LTD.
WESTMINSTER, LONDON, S.W.I